



Star Power

The Big Idea:

Real shooting stars are amazing streaks of light that burning meteoroids leave behind. In this activity, you'll fold paper into stars and see how far they fly.

You Will Need:

- ★ 2 square sheets of paper per star
- ★ A measuring tool (e.g. ruler or measuring tape)
- ★ Pencil and scrap paper
- ★ Tape for the easier version

The Math Behind the Scenes:

- ★ Geometry: shapes, angles, symmetry
- ★ Linear measurement
- ★ Comparing distances

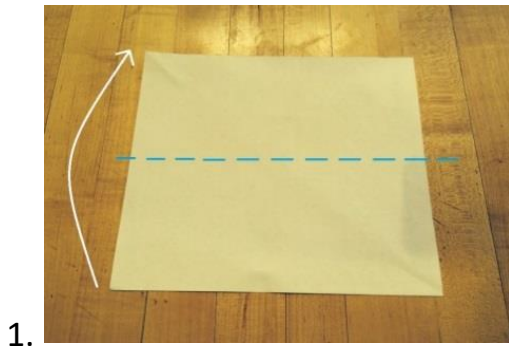
Here's a step-by-step video of making the origami star:

<https://www.youtube.com/watch?v=zCiO5TzvGFk>

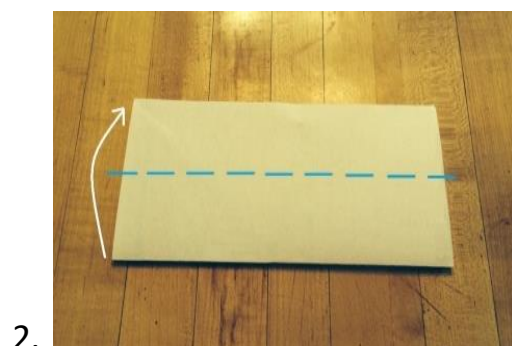
The video was originally made for our after-school Crazy 8s club, so it uses some slightly different terminology. But the steps are the same! The simpler star is shown first. Jump to 2:02 to view the more complex version.

Little Kids: The Making of a Star

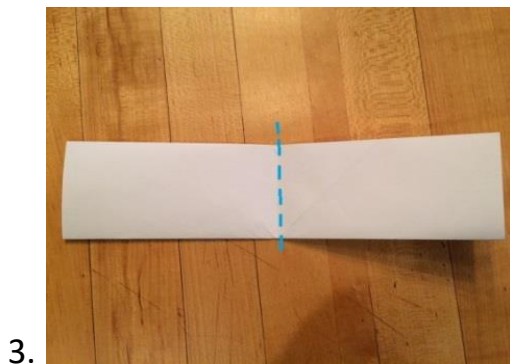
Everyone gets 1 square sheet of paper. If your paper is blank, it's helpful to color one side. Then, follow the folding directions below.



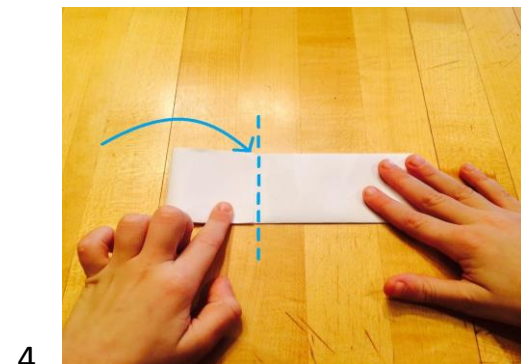
Fold the paper in half by folding the bottom edge up. If your paper has a design, place the design side down.



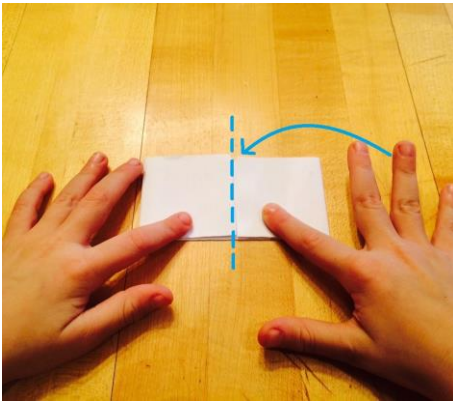
Now fold in half again by folding the new bottom edge up.



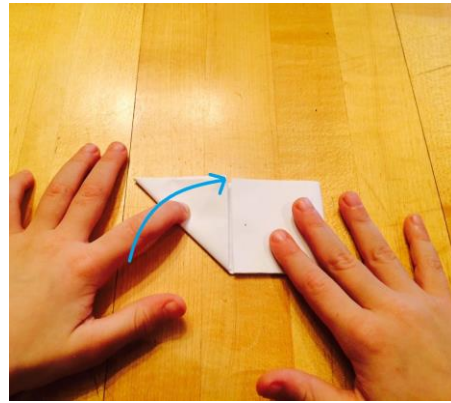
Fold across to crease the middle. Then unfold the strip.



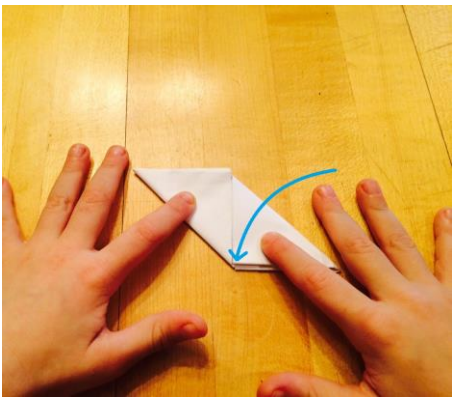
Fold the left edge to the right so it lines up with the middle crease.



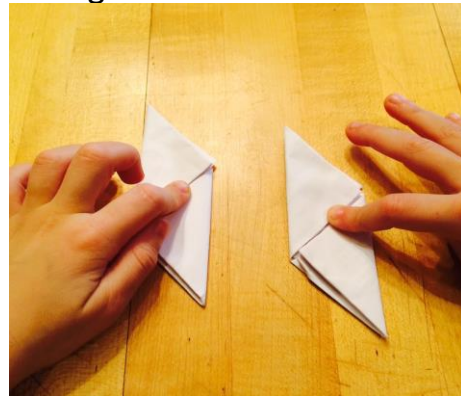
5. Now fold the right edge to the middle crease.



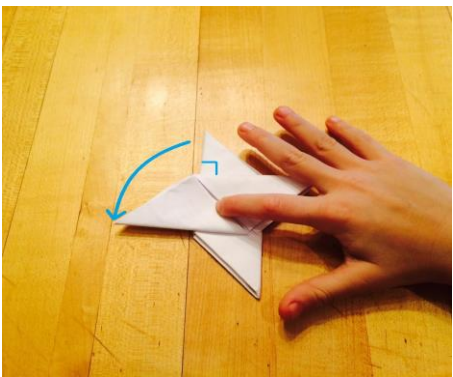
6. Fold the bottom left corner up to the crease to make a triangle.



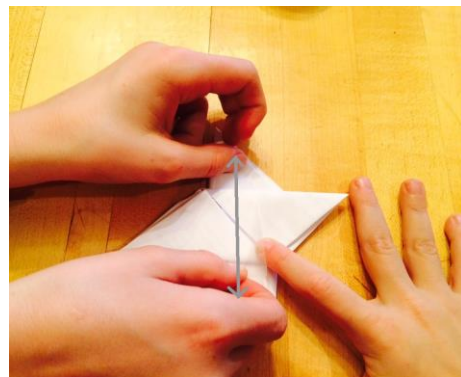
7. ...and in the same way, fold the top right corner down to meet the same crease. You'll end up with a parallelogram.



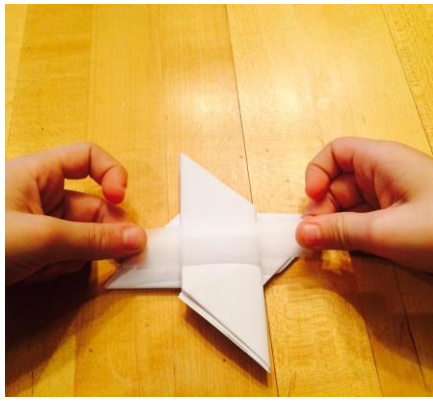
8. Now repeat steps 1-7 with a 2nd sheet of paper to make another parallelogram!



9. Turn one shape to the left and place it on top of the other shape to make a cross. Their long edges should make a right angle.



10. While one person holds down the shapes, a 2nd person sticks a long piece of tape the length of the star to hold both shapes together.



11.

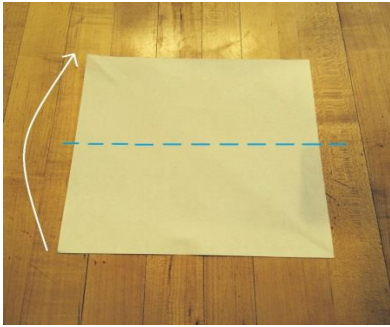
Then flip over the star, and secure with a 2nd piece of tape. Now your ninja star is ready to fly!

Throwing Contest

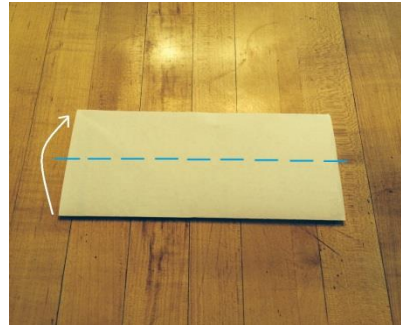
1. Gather throwers at a starting line.
2. Throw your stars one at a time.
3. Use a measuring tool to measure how far each one flies.
4. Record the results of 3 throws.

Big Kids: The Making of a Star

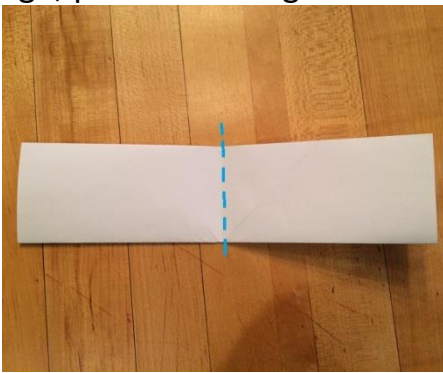
Part I – Make a Z



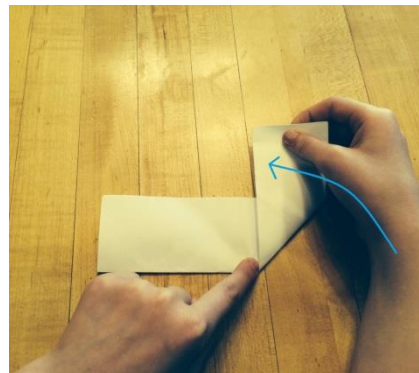
1. Fold the paper in half by folding the bottom edge up. If your paper has a design, place the design side down.



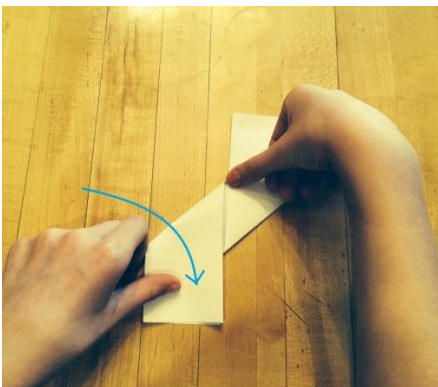
2. Now fold in half again by folding the new bottom edge up.



3. Fold the left side of the strip across to the right side, make a crease in the center, and open the strip.



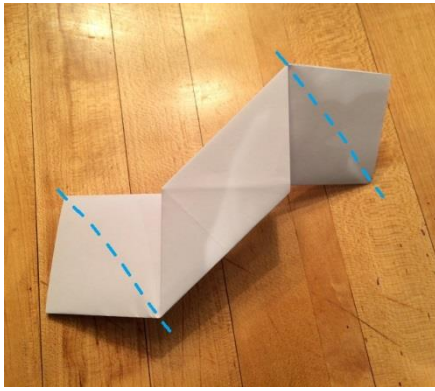
4. Fold the right end up to make an L by holding down the middle crease.



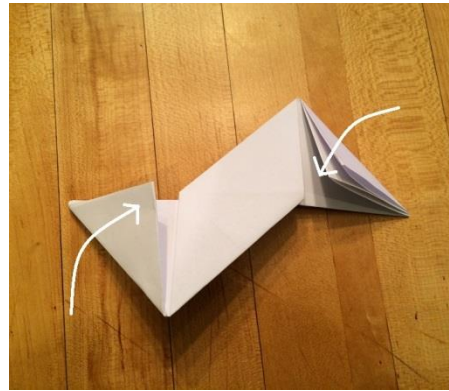
5. Now fold the left edge down.



6. Your shape will now look like this.

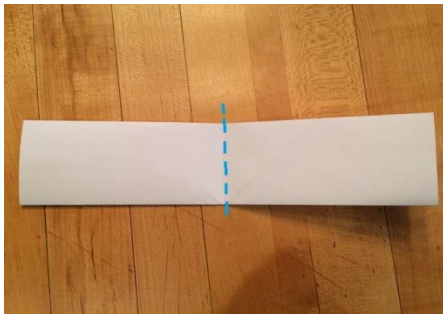


7. Flip it over so there's a square on the bottom left and a square on the top right. The bottom corner of the left square folds up diagonally in half- as shown by dotted line.

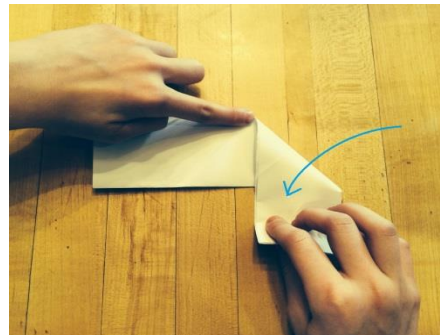


8. ...then the right square top point folds down diagonally in half as shown by the white arrows. Move this shape to the side.

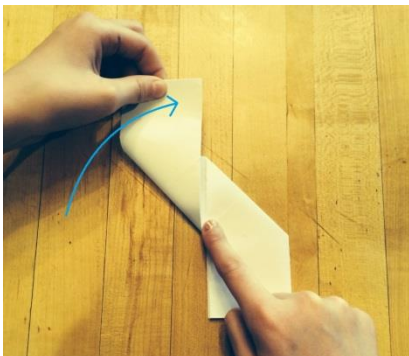
Part II - Make the Mirror Twin!



9. With your second sheet of paper, repeat steps 1-3 to get to the shape shown in this photo.



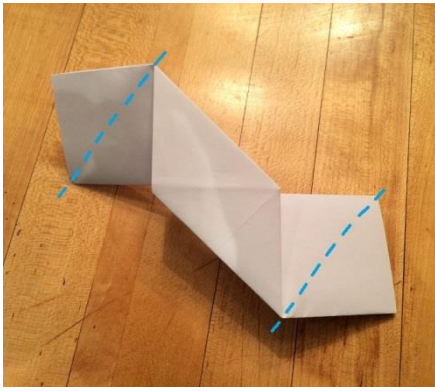
10. This time the right end folds down...



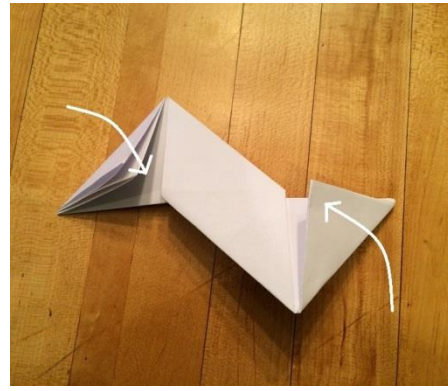
11. ...and the left end folds up...



12. ... to get the shape shown here.

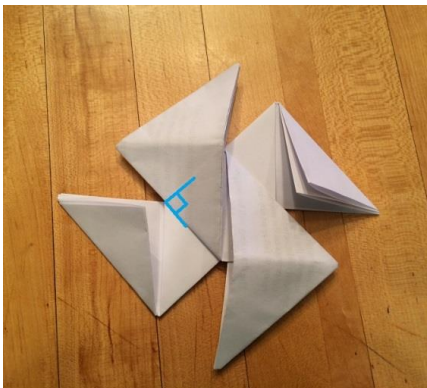


13. Flip it over so there's a square in the top left corner and a square in the bottom right corner. The top corner of the left square folds down diagonally...



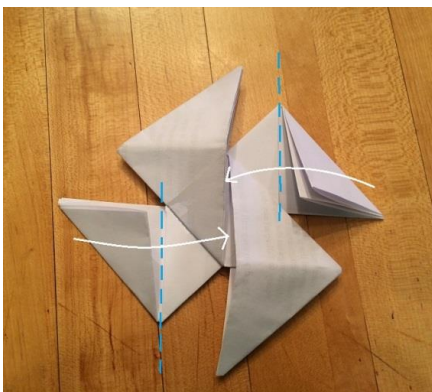
14. ...and the bottom corner of the right square folds up diagonally.

Part III - Bring the Twins Together



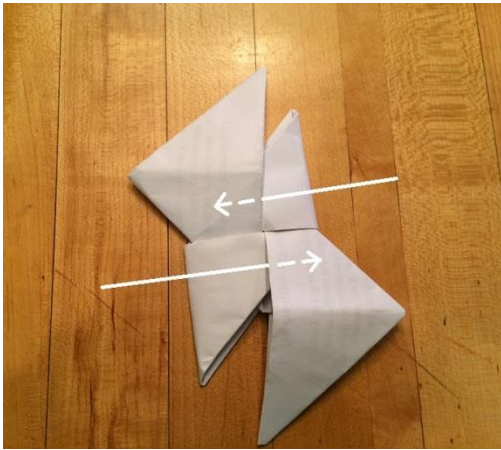
15.

Keeping this second Z in place, place the FIRST Z on top at right angles, with the loose corners facing down. The smooth sides of the center shape should be touching each other.

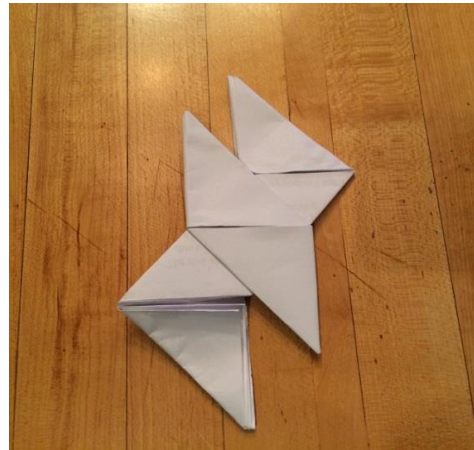


16.

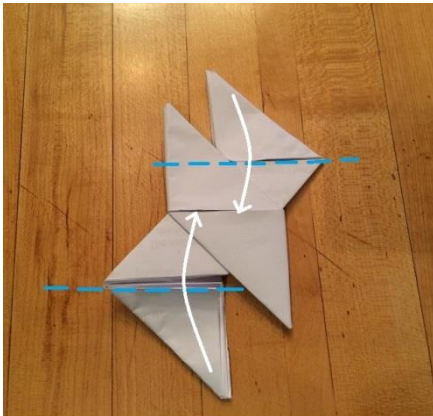
Fold as shown by the 2 blue lines: the left point folds across to the right as the white arrow shows, and the right point folds across to the left.



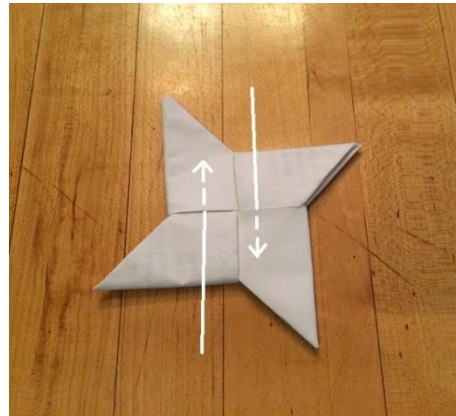
17. As you fold, tuck the left and right points in by shoving them under the slit in the middle.



18. Flip the whole thing over so you're holding it like this.



19. Now fold the top point and bottom point to the middle in the same way, along the blue lines shown.



20. Tuck the top point under the slit like the other time, then tuck the bottom point. You're done!

Throwing Contest

1. Gather throwers at a starting line.
2. Throw your stars one at a time.
3. Use a measuring tool to measure how far each one flies.
4. Record the results of 3 throws.

Riddles and Questions

Kindergarten: What shapes did you see while making your star?

1st-graders: How many giant steps would it take you to reach the distance of your farthest throw? How many teeny tiny steps would it take?

2nd-graders: What's the difference between your longest and shortest throws?

3rd-graders: How many pairs of parallel lines can you find on your star? How many perpendicular pairs can you find?

4th-graders: Does the star have symmetry? If so, how?

5th-graders: Look closely at the angles on your paper airplane. Do you have more obtuse, acute, or right angles?

Answers:
K: Answers may include squares, triangles, rectangles, and kites.
1st: Answers will vary.
2nd: Hint: Subtract the shortest distance from the longest one.
3rd: Hint: Parallel lines will never cross, perpendicular lines meet at a right angle.
4th: Yes-rotational symmetry!
5th: Hint: Right angles are 90 degrees, acute angles are less than 90 degrees, and obtuse angles are greater than 90 degrees.