

# PAPER PLANES

## MATERIALS

- 8.5" x 11" cardstock paper (can also use regular paper)
- Template
- Optional: Rubber band and Paperclip

## INSTRUCTIONS

1. Fold the template paper in half on line 1.
2. Open the paper up. Fold the top corners in on lines 2A and 2B.
3. Fold the slanted edges to the center line on lines 3A and 3B.
4. Fold in half on line 1.
5. Keep it folded, and Fold the wings out on lines 5A and 5B.

! Try folding the wings in different ways to see how it flies!



The tips of paper airplanes can sometimes be very pointy. Never shoot a paper airplane towards another person!

We recommend you watch the following video to construct your airplane if possible:



<https://www.youtube.com/watch?v=1PVA2nPU60U>

Try one of the extensions!

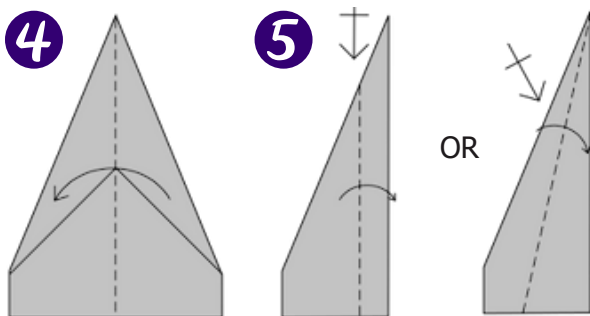
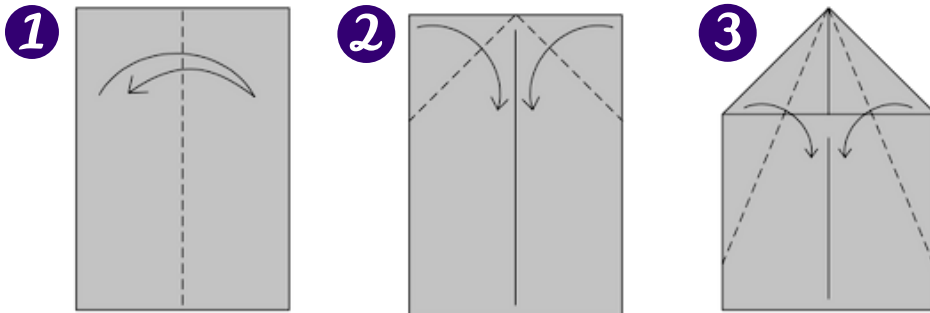


## EXTENSION #1

Are you looking for more power? With the help of an adult, use a sharp pencil to make a hole at the front of the plane under the wings. Put the rubber band through the hole and loop it through itself. Use your finger to launch your plane and watch it soar!

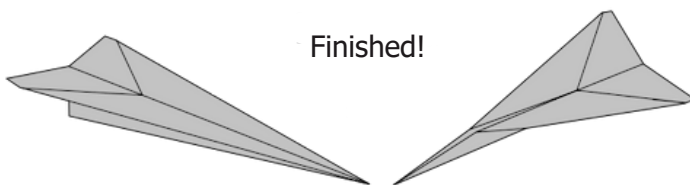
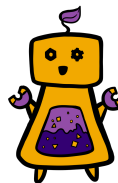


Consider adding a paper clip to the front of your plane OR fold your plane in different ways to see how it flies.



### FLIGHT INSTRUCTIONS

Hold near the back of the paper plane and throw with a quick motion.



# PAPER PLANES

## EXTENSION #2 (LAUNCHER)

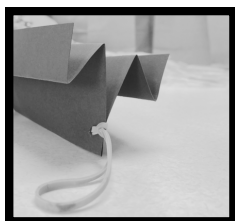
1. Fold the cardstock in half.
2. With the help of an adult, use a sharp pencil to make a hole into the cardstock in the corner 1 cm from the folded edge.
3. Fold one side of the cardstock to the folded edge. Flip it and do the same thing on the other side.
4. Create flaps by folding one side of the cardstock in half to the folded edge. Flip it and do the same thing on the other side.
5. Put the rubber band through the hole and loop it through itself.
6. Place the end stretched the rubber band to the opposite diagonal corner of the launcher.
7. Slide the paper plane into the folded opening.
8. Pull on the launcher's flaps under the rubber band to launch the airplane.

We recommend you follow the instruction on this website to construct your launcher if possible:

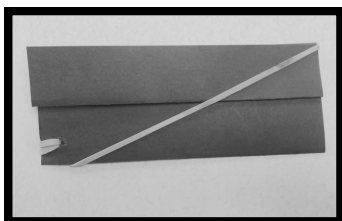


<https://frugalfun4boys.com/paper-airplane-launcher/>

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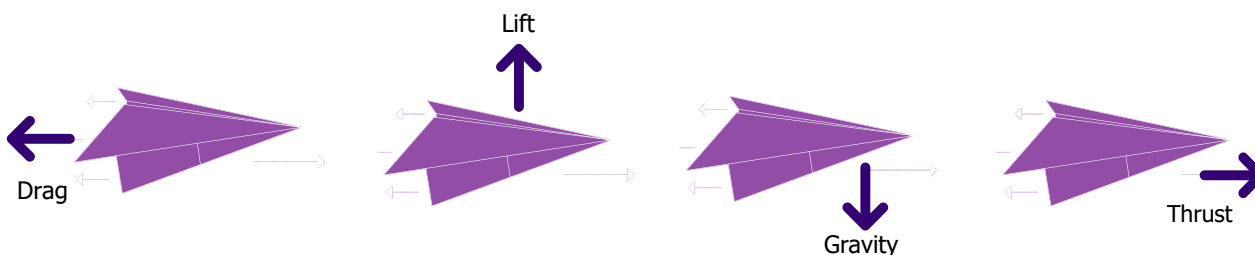


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## THE SCIENCE BEHIND IT ALL

There are **four forces** that act on object in flight - drag, lift, gravity, and thrust. When all of these forces are balanced, planes are able to fly for long distances.



If you want your plane to fly as far as possible, you need a plane with as little **drag** as possible. The pointy nose of your paper plane gives it an aerodynamic shape meaning it moves through the air easily.

**Lift** is created when the air below the plane's wings is pushing up harder than the air above it is pushing down. It is this difference that enables a plane to fly.

You need to keep your plane's weight to a minimum to help fight against **gravity's** pull to the ground.

**Thrust** is the forward movement of the plane. The thrust comes from the muscles of the "pilot" as the paper airplane is thrown.

STEM TO-GO ACTIVITY

PAPER PLANES

TEMPLATE

2A

1

2B

3A

3B

5A

5B