How to Make A Far Flying Paper Airplane
By Mike Chahin

Build Time: 3-5 minutes

Below is some background information on the history and engineering behind paper airplanes. The instructions that follow will outline how to make a paper airplane that will fly far. This design can be used for competition or fun. Each step will consist of how to fold the paper airplane. You can build the paper airplane anywhere you like, however the best place to throw your airplane is outside or in a large open room or hallway. Upon completion, your paper airplane should be able to successfully travel at least 30 feet.

Paper airplanes (originally called paper gliders) have generally been considered to originate from Ancient China or Japan. With time, many other designers have improved and developed the paper airplane, while using it as a fundamentally useful tool in aircraft design. The pioneers of powered flight, like Leonardo Da Vinci and the Wright Brothers, have actually studied paper airplanes in order to design larger machines. Today, paper airplanes are still being built by professionals, kids, and everyone else in between for a variety of reasons. Increasing in popularity are paper airplane competitions for kids. Participants compete to see who can throw an airplane the farthest. The paper airplane design in this instruction set is perfect for those types of competitions.

Paper airplanes are really gliders, meaning an aircraft without an engine. Four forces of flight (thrust lift, weight, and drag) act on a glider during its flight. A glider must be launched from a position higher than ground-level so that the altitude and gravity generate a velocity for forward motion. A long flight will occur when these four forces are balanced. In general though, the stronger the thrust, the faster the paper airplane will travel.

Materials

Required
- 8.5 x 11 inch paper (printer paper preferred)
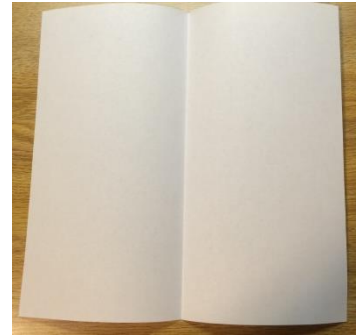
Optional
- Tape
- Ruler
- Pencil or pen

Warnings

- Fly your paper airplanes in a larger area, away from foot and vehicle traffic
- Never throw a paper airplane at a person

Steps to Create Your Paper Airplane

1. Fold the piece of paper in half **lengthwise**, lining up the long edges and unfold
*You can smooth out the folds/creases by using a ruler.*

2. Fold the top two, outer corners in towards the center to create triangles that **meet along the center crease**
You can use the ruler and pencil to mark the creases so that they are easier to see.
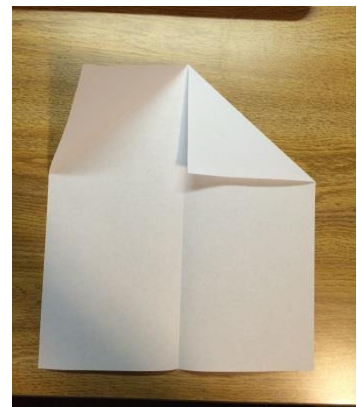
3. Flip the entire paper over so that the triangles you just folded are facing down
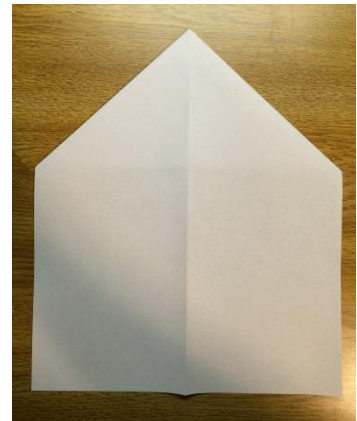

4. Fold the triangle at the top down over its bottom edge, so that the triangle that was pointing up is now pointing down
When folding the triangle down, make sure the tip of the triangle and
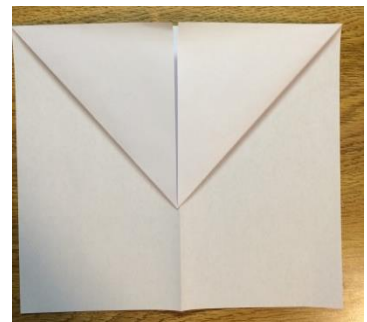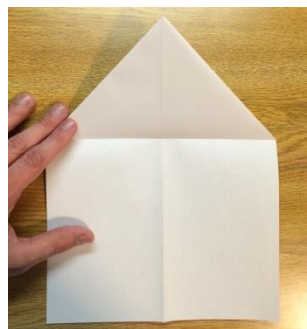
*the center crease line up. Your paper should now be a **square**.*
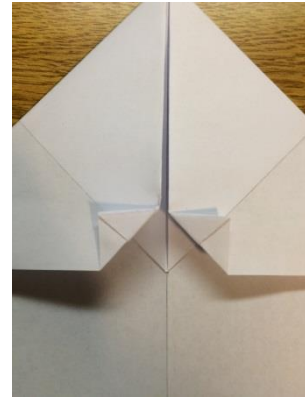
5. Fold the top two outer corners inward to create triangles exactly like in **step 2**
This step will create two thick triangles that meet at the center crease.
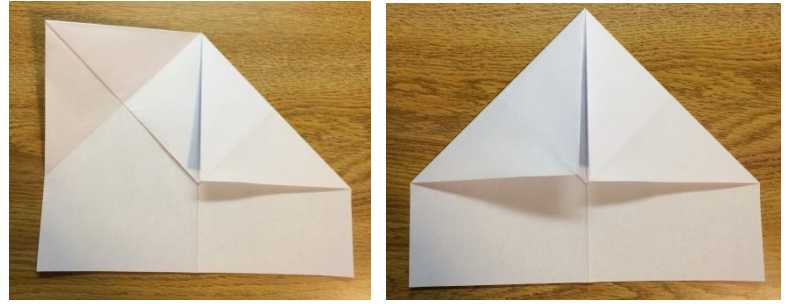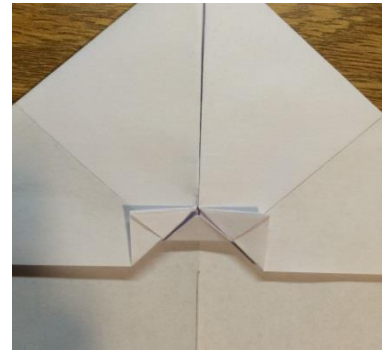
6. Fold two small triangles up from the tips of the two triangles you created in step 5
*Make sure that the two triangles are **symmetrical across the center crease.***

7. Fold another small triangle up in between the triangles you made in step 6
*This will help keep the wings of the paper airplane in place when it is in flight.*

8. Fold the paper in half, along the original center crease
*Fold the paper airplane in half so that the triangles you created in steps 6 and 7 are **facing out**.*
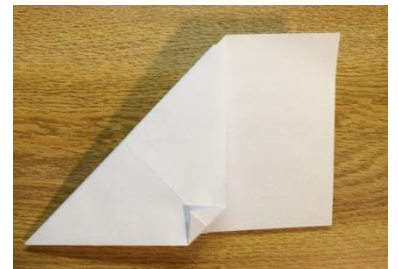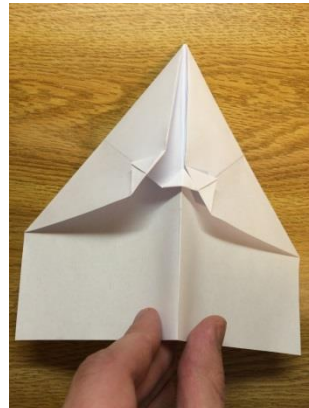
9. Fold one side of the paper airplane down to make its wing
   The diagonal part of the airplane should be folded downward so that it lines up with the horizontal bottom edge.
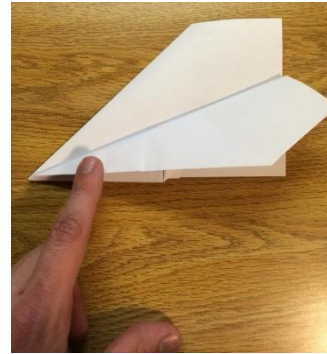
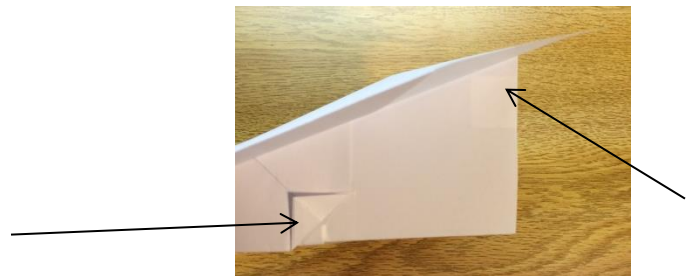10. **Repeat step 9**, except on the other side of the paper airplane
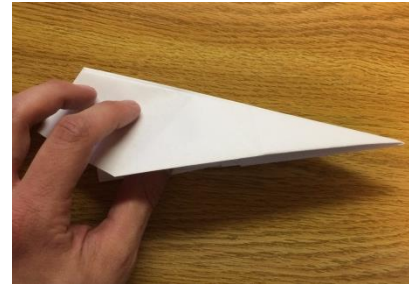
11. Throw your completed paper airplane
    For the best flight, grip your paper airplane where the small triangles are located

Optional Step

12. Place tape over the small triangles on the side and at the back of the airplane
    The tape will help hold the plane together and make it fly farther.

Troubleshooting Tips

If your paper airplane fails to fly well or diverts from its path, try performing these tips:

- Use the ruler to flatten out folds to make the paper airplane look nicer and fly farther
- Use a different type of paper
- Repeatedly throw the paper airplane to observe its flight pattern
- Throw the paper airplane a little harder than normal

- o   There is an optimal thrust you must put on the paper airplane
- Fold the tip in or add weight (via a paper clip or staple) to the nose of the plane to provide more lift and protect the plane from crashes
- Bend the left side of the tail up and the right side down if the airplane flies right when thrown
- Bend the right side of the tail up and the left side down if the airplane flies left when thrown
- Bend both sides of the tail up if the airplane flies down when thrown
- Bend both sides of the airplane down if the airplane stalls in flight

Glossary

➢ Drag- resistance an object experiences when it is traveling through the air
➢ Lift- when the air below the airplane wings is pushing up harder than the air above the wings are pushing down
➢ Stall- whenever an aircraft of any kind travels up too steeply, stops midflight, and crashes to the ground
➢ Thrust- the forward movement of the plane, initialized from your muscles launching the plane (i.e. your hand and arm)