

21A.501: Assignment #1

Crisply Crafted Creations: Paper Airplanes

There are many types of paper airplanes. Some are made to look funky, most are made to fly functionally, and some are intended to be either functional or funky but end up being something else entirely. Though one can follow a list of steps, every airplane will fly a little differently because of the way a craftsman crisply creases critical curves. This is part of the fun. You have to just launch it and then step back to see how you did.

The instructions below are to create what looks to be the basic paper airplane, but what I believe to be one of the best aerodynamic designs for repeated throws, while still simple enough that I have taught kids as young as 5 to fold this plane (with perhaps more assistance than you are receiving with this sheet of instructions—please don't be discouraged by the nature of this assignment).

Additionally, it should be noted that there are many different approaches to create these creases and perhaps some steps you may switch around. However, each crease must be made with careful attention because each subsequent fold is based on the precision of the last one. The symmetry necessary for the aerodynamics makes both accuracy and precision very important. However, “careful attention” does not mean soft folds. Fold with intention! Craft crisp creases! Crisp creases keep each layer of paper closer to each other, which actually makes the precision of each subsequent fold much easier.

There are also different methods to decorate the plane—ie. at what steps, with what media, if at all—that I will not get into here. I believe that is part of the craft should not be explained by someone else but rather something you should feel the freedom to play with on your own to really make the craft your own.

1. Orient piece of 8.5”x11” paper horizontally on a flat surface so the long edge is closer to you, “landscape style”.
2. Fold the top edge down so the long edges are stacked on top of each other, “hot dog style”.
 - a. Don't unfold it.
3. Take one flap from the bottom left corner and fold it up so the short edge is flush with the crease you just created.

- a. To form a clean point, hold the flap corner with one hand at the crease and roll the fold at the peak with the other end.
 - b. Be careful not to fold the corner past the crease. This could make it harder to fold in the flaps in Step 6 and/or create an off center nose that all subsequent creases are based off of.
4. Flip over your “hot dog” and repeat the step folding over your corner.
5. Unfold your center crease and orient your sheet of paper such that it looks like a tall house – point made by two folded flaps at the top with the flaps facing up.
6. Fold the paper midway such that the point is folded down the center line so it looks like the “Gmail” (envelope) logo. If you are not familiar with envelopes or the Gmail logo, note that you should form a horizontal crease midway down the page such that there is about 1 inch between the point and the bottom of the page.
7. Now take the top two corners and fold them into the imprint of the center line so that the edges are flush with the center line and you form another point, “short house”.
 - a. This is the same corner flap fold that we did Steps 3-4 except without folding the paper along the center line first. I like to do this fold open because if we were to fold it down the center as before, this time there are two paper layers to fold in half and when folding the corner flaps one of them usually slides forwards and it is hard to tell if you are folding along the center crease. It also allows me to make sure that both sides are even as this is the last flap fold. However, I would recommend that you try folding the flaps in this open formation and when folding along the center first so that you might understand what I’m talking about and so that you may get a feel for the paper’s dynamics and figure out your own technique.
 - b. Err on the side of leaving a millimeter gap between these two flaps rather than making the two center edges flush to each other. This will help when you get to the step of folding the center crease again because there are now several paper layers.
8. You should see the point, “tab” from the “tall house” sticking below the flaps. Fold this tab up so that it “tucks in” your flaps.
 - a. This is a key step that makes this plane more aerodynamic. The most basic paper airplane usually has these flaps hanging free.
 - b. You should notice the center folds of the tab align with the center folds of the “roof” of the house.
 - c. You might be wondering why we made two peaks in the first place. This is because we want the nose of the plane to be heavier, which helps direct the plane as it glides and slices through the air.
9. Flip your “tucked house” over and fold it in half along the center line such that you can still see the tab

- a. You should also notice that the two halves are even, if they are a little off, that's ok, wait to fly it first. It is not recommended to re-fold an already creased paper airplane because the planes and edges won't be as crisp and aerodynamic. Paper airplanes really are quite sensitive to slight adjustments in their wings.
10. Fold the long edge of the wing such that it is flush with the center line and a point is formed. Repeat on the other side.
- a. Don't rush this fold, this takes me a while. You need to make a crisp crease through several layers of folds. I usually flattened the point with fingernail to make sure it is as crisply creased as possible (what makes it hard to fold several layers of paper is when they slide against each other). Then with my left thumb midway down the centerline crease and my left index at the point, create an indent with my index fingernail at the creased point as I fold the long edge over with my right hand and then roll the fold at the peak with my index fingers and begin to apply pressure first at the peak with my left index rolling finger and then my right hand folding the wing over and then the left thumb.
 - b. The long edge should be flush with the center crease, but especially with the thickness of the tab, the edge likely won't be flush the whole way. Prioritize being flush closer to the point. It is most important for this part of the plane to be streamlined.

You should now have your paper airplane! Yay! At this point you can adjust your final folds if you notice that the wings are asymmetrical. It is more important that the wings are aligned than whether individually they are exactly flush with the center line. If you need to go back more than one step or if you have already crisply creased your last step, I would recommend starting over with a new sheet of paper. Give it a launch though first! Some other adjustments you can make to the wings are ensuring that they are folded the same amount. You may also find more success in the wings angled up slightly so that when it glides it can self correct its line slightly. If you want your plane flight to curve to the right, lightly fold the back right tip up. If you want it to fly left, fold the back left tip up, if you want the nose to tip up right as you fly it, fold both back tips up. If you want to create a little more lift, you can experiment with curving the wings slightly. After a few flights you may notice that your tip is a big smudge. This airplane has a thicker tip so it is more robust than your basic plane, but it will still get smudge after 5 or so throws so I like to make sure to straighten it out by re-creasing it with fingernail indentations before each throw.

Now for decoration! Definitely not a requirement, but can be fun and can also be important to differentiate your plane from others. If you use markers, be aware that the weight and wetness will droop your wings and change their shape a bit. If you are using crayon or pencil, apply light pressure so as not to dent your wings. I usually decorate at the end so I know where my creases are and unfold the plane into its "tucked house" shape (open out the wings) so it is in its most 2D shape with only final folds to redo. (if you open it out past the final folds, your final folds are less

likely to be crisp because the earlier folds that your final folds depend on may change imperceptibly but create a perceptible change in the next folds. It is not ideal for final fold edges to not be as crisp.)

Enjoy your crisply creased craft!

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