



MY FIRST

AIRPLANE KIT



CONSTRUCT
Cool Planes Made
with Balsa Wood!

Instructions and More!



WARNING:

CHOKING HAZARD - Small parts.
Not for children under 3 years.

Welcome young pilots! The My First Airplane Kit has everything a pilot-in-training needs. You'll use custom aircrafts and other materials to conduct flight experiments and learn all about how planes soar through the air. Be sure to explore the 4 airplane cards in your kit to learn about some real, amazing airplanes. Get ready to spread your wings.

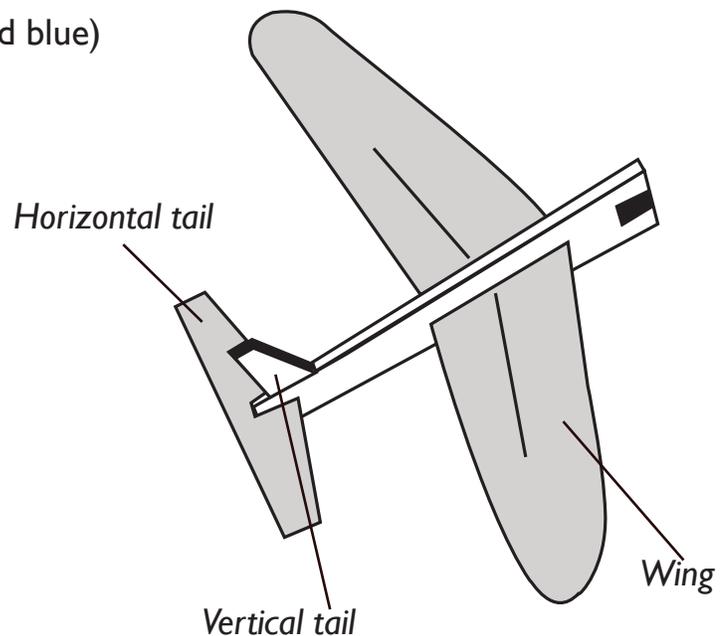
Note to Adult Copilot: This kit is meant to be explored together by a child pilot and an adult copilot. With younger children, please read the information carefully and explain what you feel is most important. Help your child follow the activities in order to get the most educational value from your kit. Above all, have fun!

What's in your kit:

- 2 balsa wood bodies
- 2 balsa wood wings
- 2 balsa wood vertical tails
- 2 balsa wood horizontal tails
- 1 foam plane
- 1 foam plane launcher
- 3 paintbrush pens (red, yellow, and blue)
- 3 sheets of decals
- 1 activity guide
- 4 full-color airplane cards
- 2 metal clips
- 5 pieces of color paper

What you need to get:

- Scissors
- Newspaper (optional)
- Measuring tape or stick
- Paper (8 1/2 x 11), optional



Beginning Your Pilot Training

Let's get started by designing some cool balsa wood and foam planes! Along the way, you'll learn all about how planes soar through the air. Are you ready for take off?

Flight is really about air. You might think that air is just the empty space around you, but air can push and pull objects. Think about a fan blowing paper around. The air pushes the paper.

Force happens when something pushes or pulls on something else. For example, when a friend pushes you on the swings, he or she is applying a force to your body. On an airplane, the pushing and pulling is caused by air hitting the surface of the plane. To make an airplane fly, air pushes and pulls the plane in four different directions all at once - four forces acting on your plane!

Balsa Wood Glider

The first step in your pilot training is to construct and decorate a balsa wood glider. You'll use this plane to learn about some of the forces that make planes fly.

What you need from your kit:

balsa wood body with metal clip
balsa wood wing
balsa wood horizontal and vertical pieces
paintbrush pens

What you need to get:

newspaper (optional)

Decorating Your Airplane

You have enough supplies to make 2 airplanes! You can have contests with your friend. See which goes further or faster.

1. Cover your work area with newspaper.
2. Let's make a cool custom airplane! Paint the wing and tail pieces with the paintbrush pens. Try not to paint too thickly. You can paint the body too.
3. Allow the wing and tail to dry completely. (This can take up to a few hours, depending on the thickness of the paint.)

Assembling Your Airplane (see diagram on page 1)

1. Find the top of your balsa body. The top side has a slot at the rear.
2. Place the vertical tail piece in the slot on top of the balsa body.
3. Slide the wing carefully through the horizontal slit in middle of the balsa body until it is centered. The edge of the wing with curved tips is the front edge of the balsa wing and should face forward.

4. Slip the horizontal tail piece into the back slit on the balsa body. The curved edge of the horizontal tail should face forward.

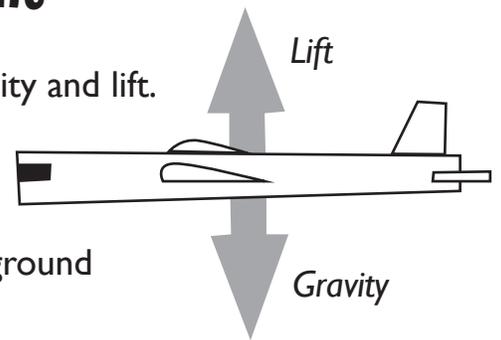
Flying Your Airplane:

IMPORTANT: Each time you fly your plane, you will have to adjust it. Look at your plane from the back, holding it level right in front of your eyes. Make sure that the wing and horizontal tail are centered on the balsa body. Give it a whirl! Hold your plane by the balsa body right beneath the wings. Toss the plane gently forward in a smooth, level, pushing motion. It helps if you angle the plane very slightly upward as you launch. Look at it go!

The Science Behind Flight

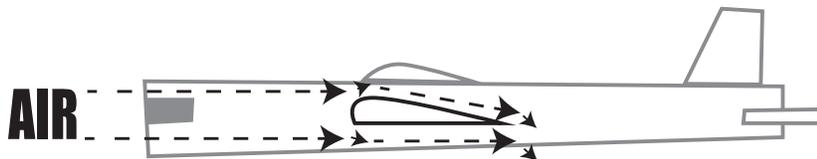
Let's talk about two forces at work on your balsa airplane: gravity and lift.

GRAVITY is a force that pulls everything on Earth downward. This is really cool since if we didn't have gravity, we'd all be floating around in space! Gently drop your balsa plane on the ground to give gravity a try.

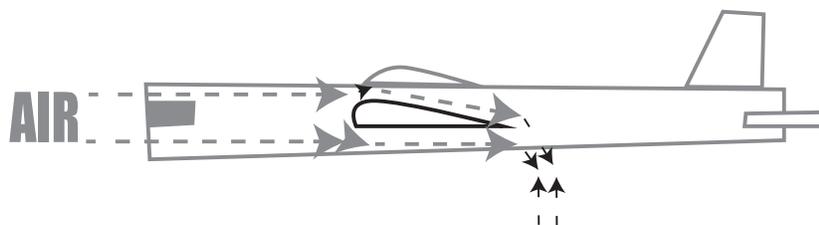


LIFT is the force that pushes your plane up into the air. Look at the picture above: notice how the two forces act against each other like a tug of war. For a plane to stay in the air, the lift has to be stronger than the gravity. Otherwise, the plane would crash to the ground.

Airplanes can weigh many tons-as much as an elephant! If elephants can't fly, how does that huge machine lift up off the ground? As your plane moves forward through the air, the air goes over and under the wing. Check out the picture below. The wing is shaped so that the air is deflected downward. This means that the wing turns the air down towards the ground.



The air underneath the wing pushes back up against the downward moving air. This air pushing up at the wing lifts your plane into the sky! Inclining the wing toward the wind causes more lift.



Foam Jet Plane

You're ready for the next step in pilot training: testing out your foam jet plane. Along the way, you'll learn about thrust and drag, the two forces that move your plane backward and forward!

What you need from your kit:

- foam plane
- foam plane launcher
- decals

What you need to get:

- measuring tape or yard stick

Decorating Your Airplane: Apply decals to your foam jet plane.

Flying Your Airplane:

1. Find a dry, open area.
2. Loop the launcher rubber band around the hook on the underside of the foam plane.
3. Hold the back of the foam plane in one hand and the handle of the launcher in the other.
4. Aim the hand holding the launcher toward empty space. **Do not aim the foam plane at anyone.**
5. Pull the foam plane back so that the rubber band on the launcher is taut.
6. Release the foam plane and watch it soar far into the distance!

Testing Your Airplane's Limits

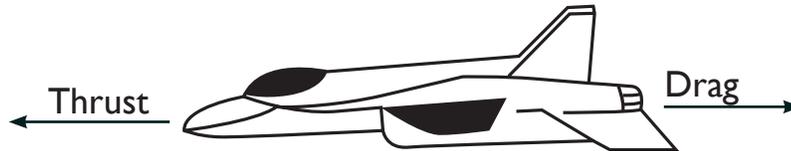
1. Let's see what your foam jet plane can do! Find a good place to launch your jet plane. The best runway space will be outside in a dry, open space.
2. To test the distance your airplane can go, launch your plane forward at a slight upward angle. Look at it go!
3. Measure the distance with measuring tape or yard stick. If you don't have one, you can measure by walking toe to toe from your starting point to landing point, counting each step. Ask your adult copilot to help measure or count.
4. Mark your results in the table below.
5. To test the height your airplane can go, launch your plane up into the air. Pay attention to how you position your arms so that you can do it the same way every time you launch.
6. Watch your plane soar up into the sky! Since it's hard to measure height with measuring tape, use a tree or your house to help you remember how high your plane went.
7. Describe your results in the table below.

Test	Distance	Height
Launch #1		
Launch #2		
Launch #3		

The Science Behind Flight

Your foam jet plane went much further and faster than your balsa glider, right? We're going to use your foam plane to learn about the two other forces in flight: thrust and drag.

THRUST is the force that pushes your plane forward. Your foam plane moved forward with your rubber band launcher. If your foam plane was a real jet plane, it would have a giant jet engine that shoots out a super strong stream of air and gas. This huge stream of air and gas thrusts the airplane forward!



DRAG is the force that tries to keep your plane from moving forward. Notice how thrust and drag act against each other. For your plane to move forward through the air, thrust has to be much greater than drag. Otherwise, the plane would stop in the air and fall down.

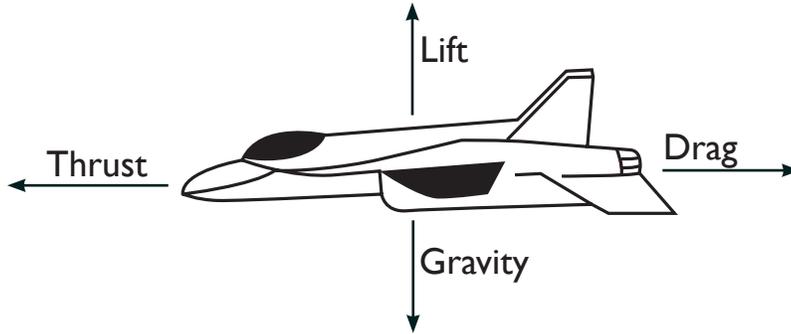
Take a look at your foam jet plane. The pointy nose helps reduce the drag because there's less plane surface for the air to push back against. What if a plane was shaped like a train boxcar or a beach ball? What do you think would happen?

Mini-Experiment: Thrust and Drag

Compare the features of your foam jet plane to your balsa glider. Write down your observations in the chart. Think about how each plane flies: one flies really fast while the other floats gently through the air. Why do you think each plane was designed the way it was?

Feature	Foam Jet Plane	Balsa Wood Glider
Nose (shape/size)		
Wings (shape/size)		
Tail fins (shape/size/quantity)		

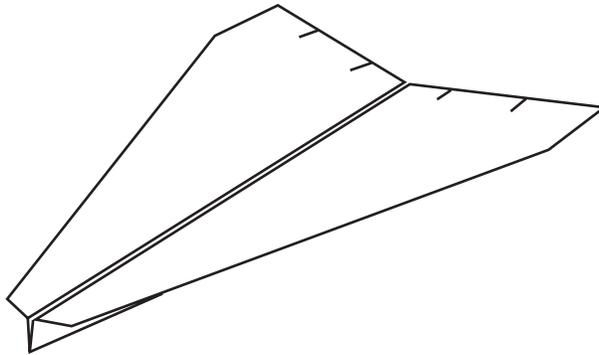
Four forces-gravity, lift, thrust, and drag-work together to make planes fly. When lift and thrust are stronger than gravity and drag, your plane soars through the sky!



Paper Airplanes

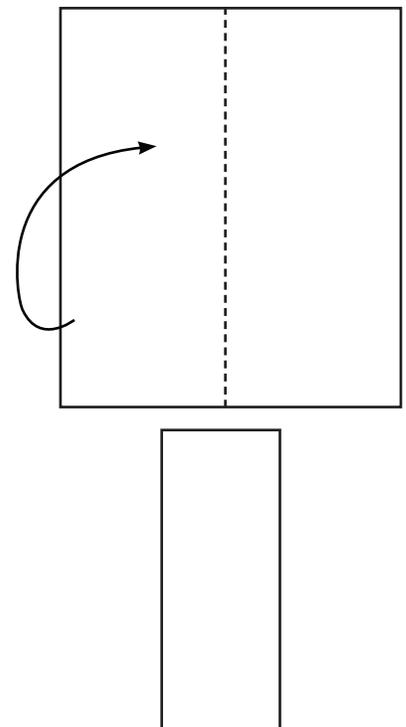
Use the color paper enclosed and follow the instructions below to make your very own paper airplanes.

Template A: Bullet



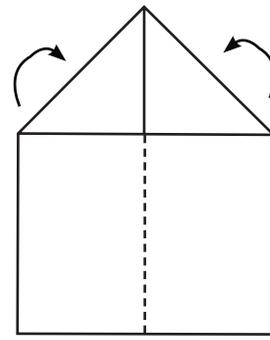
Easy to make and flies like a bullet...*FAST* and straight!

1. Position paper sheet with longer sides on left and right as shown.

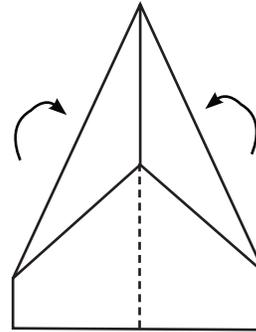


Fold in half to create center line and crease at fold.

2. Open sheet back up and pull top corners down so upper edge lines up with center line and crease at the folds.

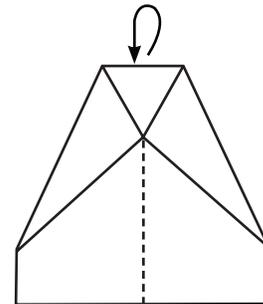


3. Fold each side over again so first two creases line up with center line and crease at folds.

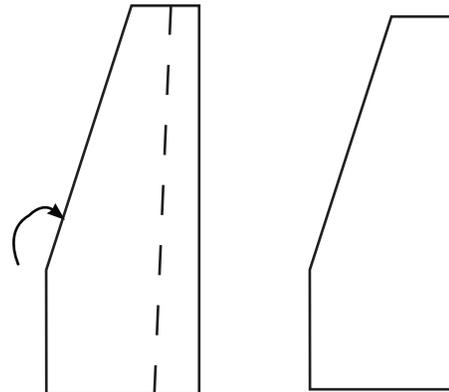


4. Pull tip of plane back so it touches where previous two folds meet at the center line, crease at fold.

Fold plane along center line again and crease.

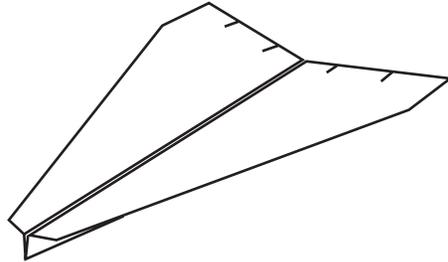
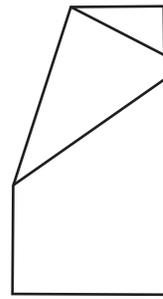


5. Lift top side of plane and fold over to right along line approximately 1/2" from center line at tip to 2" from center line at rear of plane and crease.

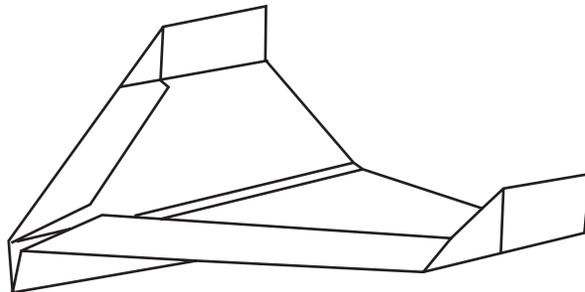


6. Turn plane over and repeat fold on other wing. Once folded wing tips should line up together.

7. Open wings up and cut two small slits in the trailing edge of each wing as shown. Your paper plane is now ready to fly like a bullet. Find more sheets of paper and make a complete squadron!

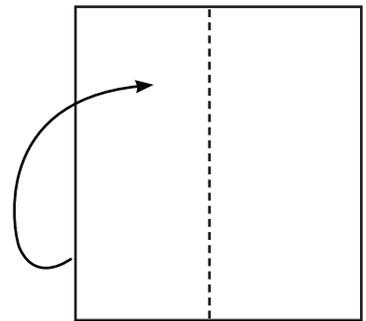


Template B: Raven

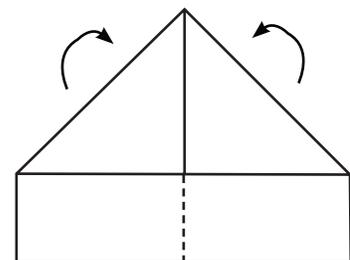


The Raven flies well at slower speeds, which makes it an excellent plane for flying indoors in smaller spaces.

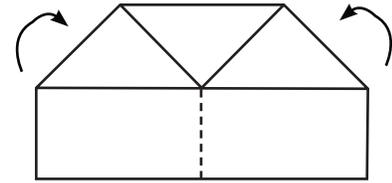
1. Position paper sheet with longer sides on top and bottom as shown. Fold in half to create center line and create at fold.



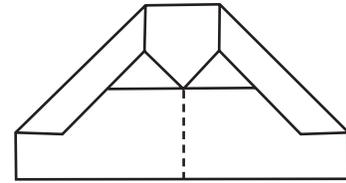
2. Open sheet back up and pull top corners down so upper edge lines up with center line and crease at folds.



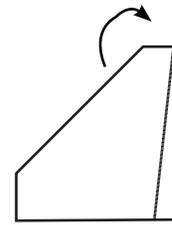
3. Fold tip of plane back so it just touches where previous folds meet at center line and crease at fold.



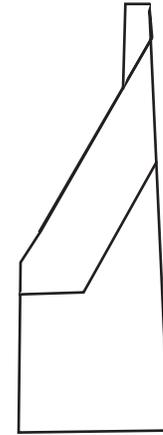
4. Fold wing edges again and crease along folds.



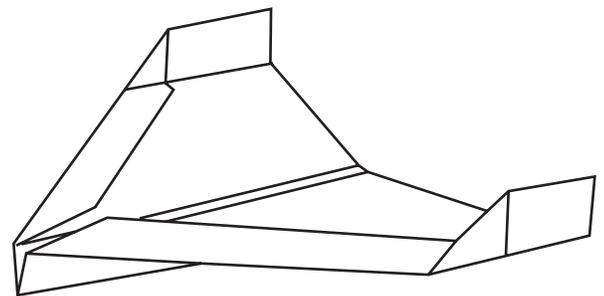
5. Fold plane again along center line and crease at fold.



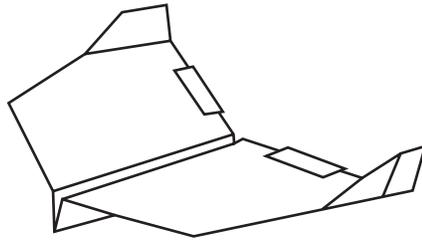
6. Lift side of plane and fold over to the right along a line approximately 1" from center line at tip to 1 1/4" from center line at rear of plane and crease.



7. Turn plane over and repeat fold on other wing. Once folded wing tips should line up together. Open wings and fold up winglets on wing tips as shown. Time to fly!

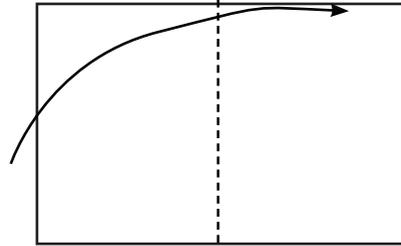


Template C: Coaster

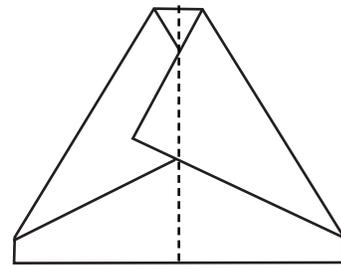


What goes up, must come down. This plane glides with the best of them. Launch it high into the air and watch it circle gently down!

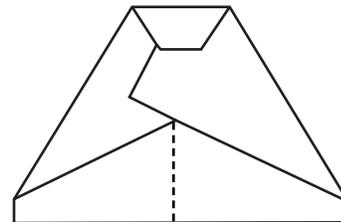
1. Position paper sheet with longer sides on top and bottom as shown. Fold sheet in half as shown and crease along fold.



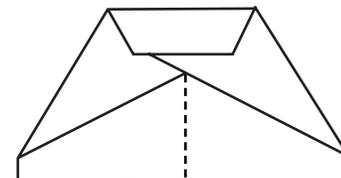
2. Fold top left corner over as shown so crease is 1/2" from center line at tip of plane. Fold top right corner over the same way leaning 1/2" between crease and center line.



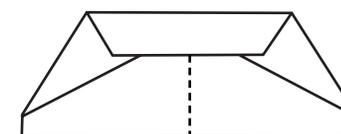
3. Fold nose down 1" and crease as shown.



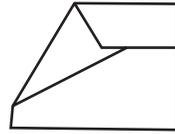
4. Fold nose again down 1" and crease as shown.



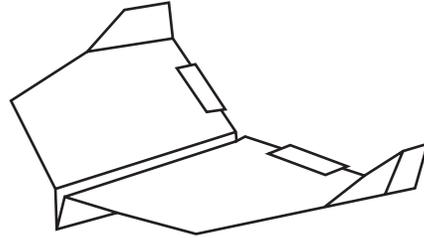
5. Fold nose down one more time 1" and crease as shown.



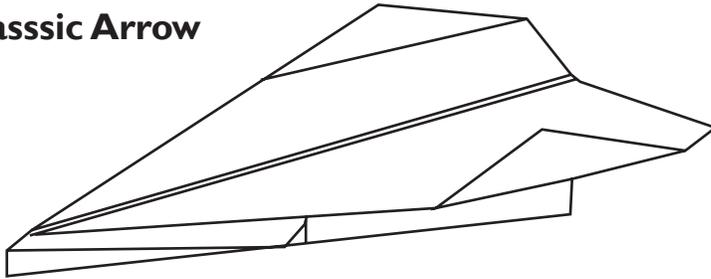
6. Fold plane again along center line.



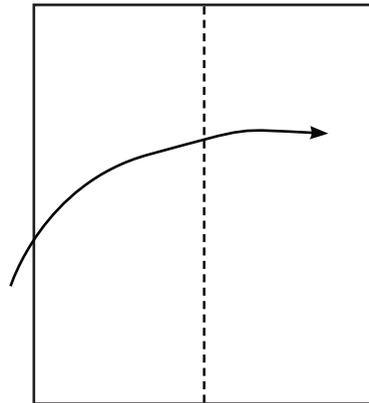
7. Fold top wing over along line shown so crease is 1/2" from center line at tip of plane and 1" from center line at rear of plane. Turn plane over and repeat on other wing. Open wings and fold small winglets at the wing tips as shown. Cut slits at rear edge of wings as shown. The coaster is ready to fly!



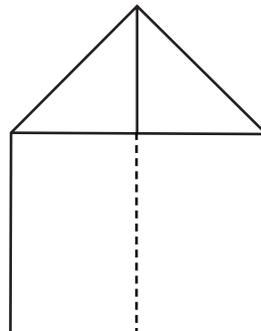
Template D: Classic Arrow



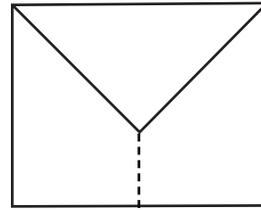
1. Position paper so longer sides are on left and right as shown. Fold sheet in half and crease along fold.



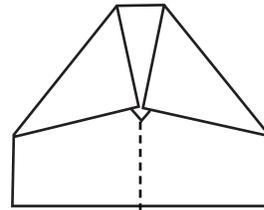
2. Pull top right corner down so top edge lines up with center line and crease. Repeat with top left corner.



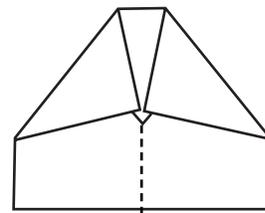
3. Fold tip down along lower edge of previous folds and crease.



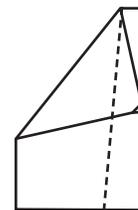
4. Fold top right corner over so it touches center line but leaves 1/4" between fold and center line at tip of plane.



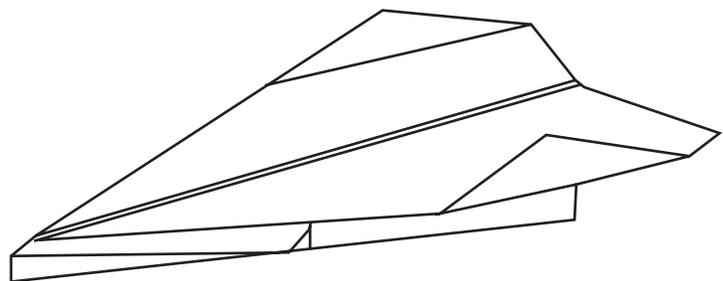
5. Fold tip up over diagonal folds to hold in place.



6. Flip plane over and fold along center line and crease. Fold top wing over along line from fold at tip to one inch from center line at back of plane and crease. Repeat for other wing.



7. Fold winglets up as shown. Now you are ready to fly!



Lab Notes

Lab Notes

A large, empty rectangular box with a thin black border, intended for writing lab notes. The box occupies most of the page below the title.

Lab Notes