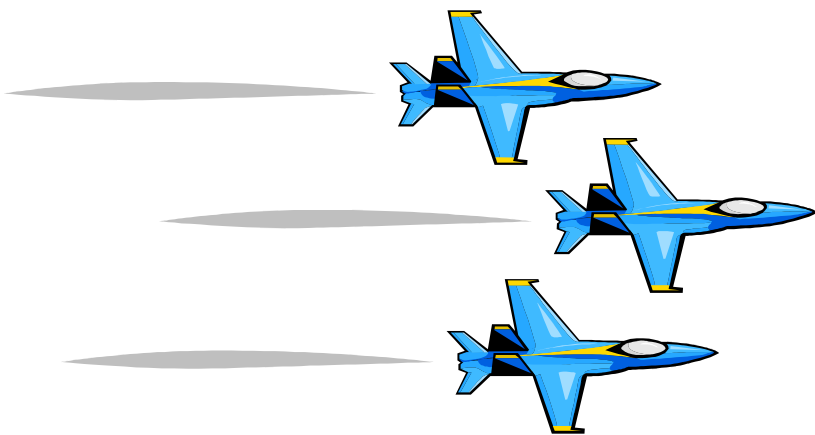


Alameda Naval Air Museum presents...

Learning about Airplanes and Flight



Things that Fly

>> There are many different kinds of things that can fly!

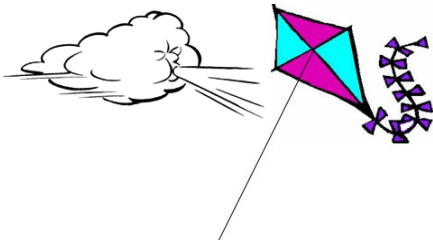
Let's have a look at some of them to see how they are different and what they all have in common.



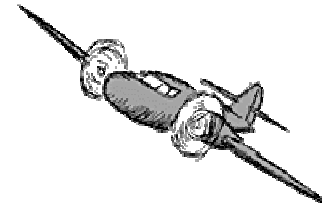
When a bird flaps its wings, air is pushed downwards and "lifts" the bird into the air.



The bee flaps its tiny wings so fast, all you can hear is a buzzing sound.
Bzzzzzzzz!!



A simple kite is just one big wing and needs lots of wind to keep it up in the sky!



The airplane has wings and an engine that moves it very fast through the air.

>> How are these different?

Insects and Birds fly all by themselves, but Kites and Airplanes need someone to control them.



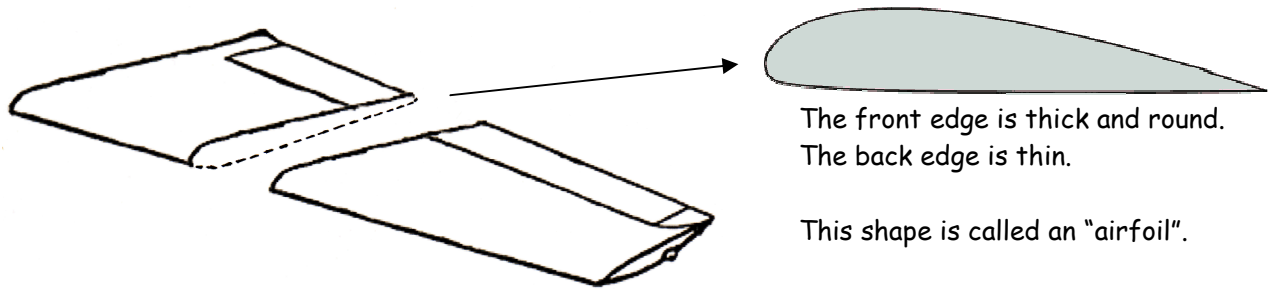
>> But what do all of these have in common?

WINGS!

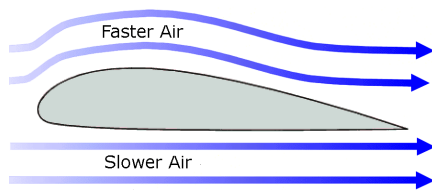
Wings must be a really important part of being able to fly, so let's have a closer look at how these work...

Wings at Work

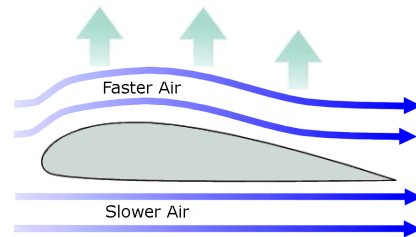
>> Looking at the wing of an airplane, we can see that it has a special shape.



When lots of air is moving over and under the wing, the thicker front edge forces the air over the wing to speed up.



As the air over the wing speeds up, it pushes on the wing less than the air below the wing.



So it's the "pushier" air below the wing that lifts the airplane into the air.



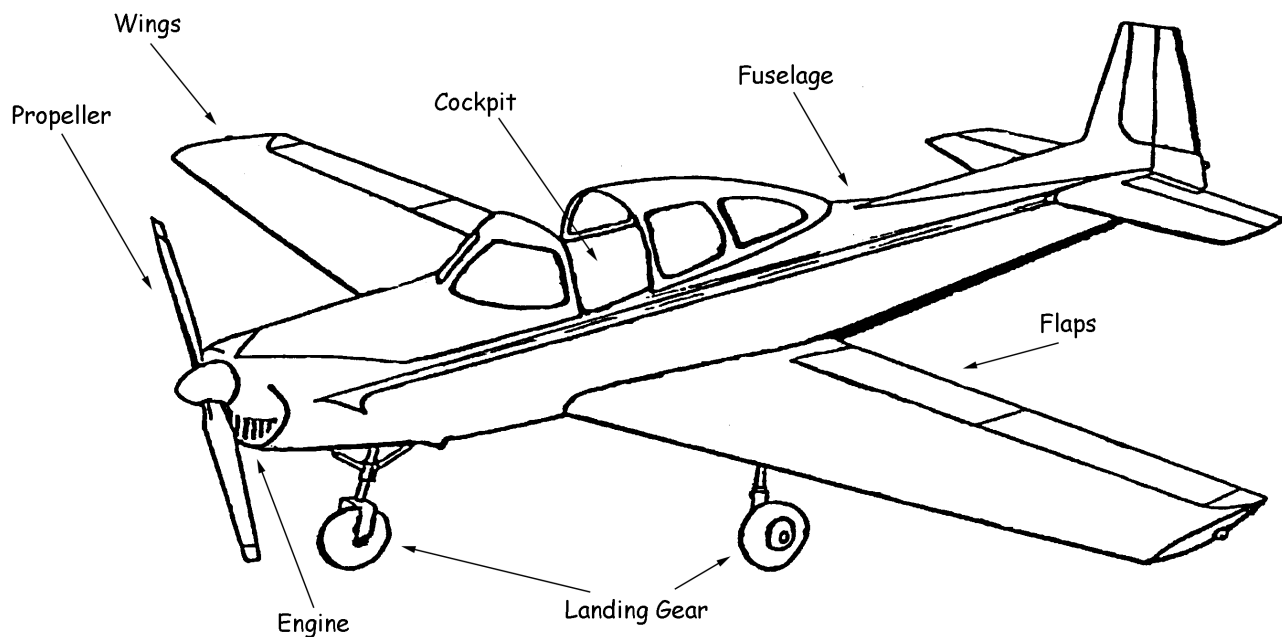
Wing Shape + Air + Speed = Flight !!!



>> What are some of the other parts of an airplane and what do they do?

Airplane Parts

>> There are lots and lots of different parts! Each one has a special job to do...

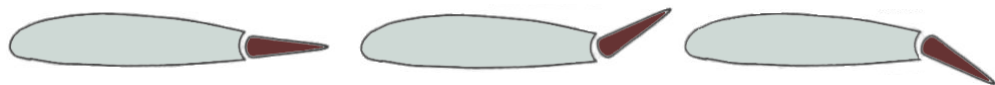


Engine The engine provides the power that moves the airplane through the air.

Propeller The propeller is a rotating blade attached to the engine.
The engine turns the propeller, which pulls the airplane through the air.

Fuselage The fuselage is the middle part of the airplane.
The wings, engine, tail, and landing gear are all attached to the fuselage.

Flaps The flaps are moving parts attached to the inside rear edge of each wing.
They help the airplane to take-off and land by changing the shape of the wing.



Cockpit The cockpit is inside the fuselage and is where the Pilot sits.
It contains all the instruments and controls that the Pilot uses to control the airplane.

Landing Gear The wheels and the parts that attach the wheels to the fuselage make up the landing gear. The landing gear supports the airplane while it's on the ground and is used to takeoff and land.

>> There are different types of engines, how do they work to power the airplane?

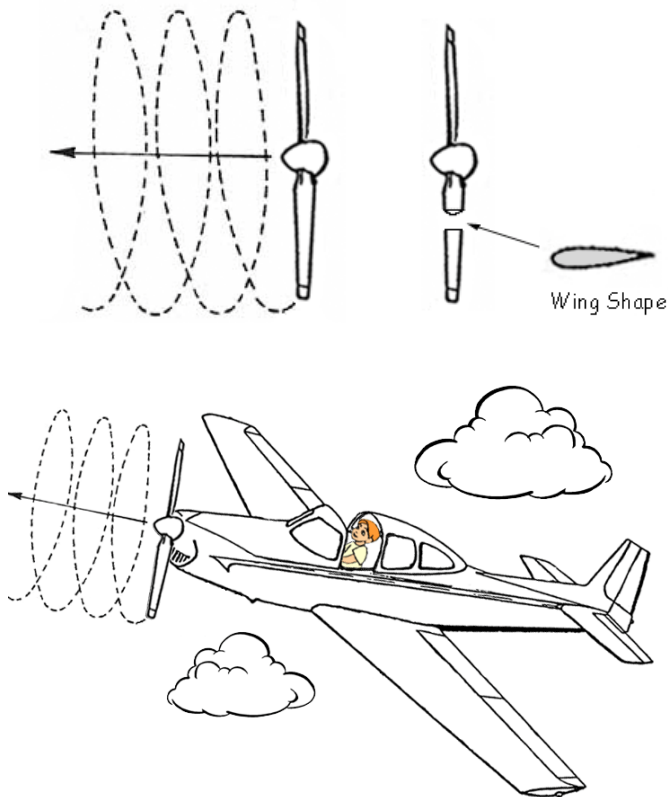
Engine Power

The engine provides the power that moves the airplane through the air.

>> There are two types of engines, each with a different way of providing that power

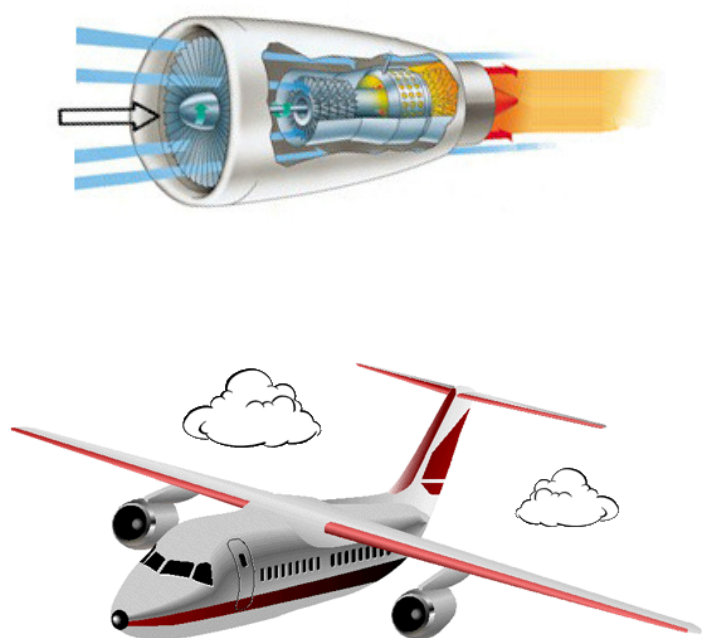
Radial Engine and Propeller

This engine turns a propeller which is shaped like a wing. The wing shape plus the speed that it's turned by the engine, pulls the airplane forward.



Jet Engine

This engine has a fan inside that takes air in the front, which is squeezed in the middle, then mixed with fuel to burn, and pushed out the back, just like a rocket!

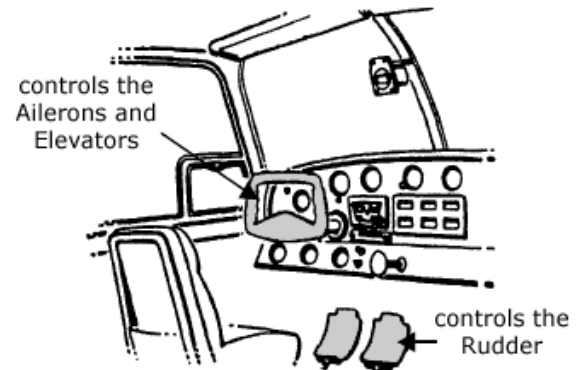
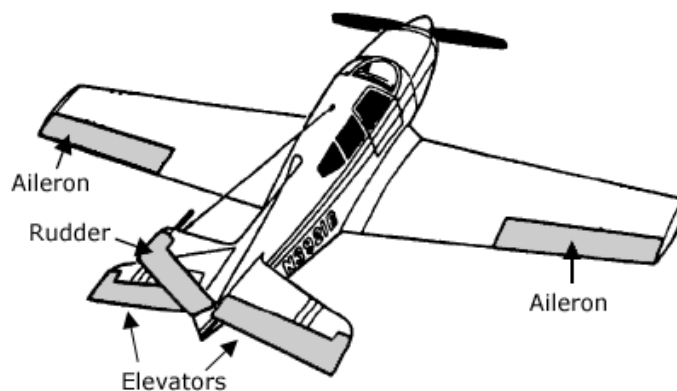


Our airplane is off the ground and flying, but we don't just want to keep flying in a straight line!

>> So how does the Pilot make the airplane go where we want it to go?

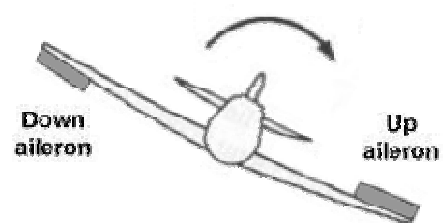
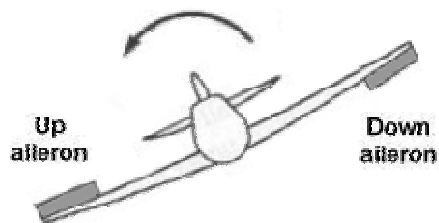
Airplane Controls

>> Let's look at the parts used by the Pilot to control the airplane ...



Ailerons

These are moving parts attached to the outside rear edge of each wing. When moved, they make the airplane tilt and roll to the right or left.



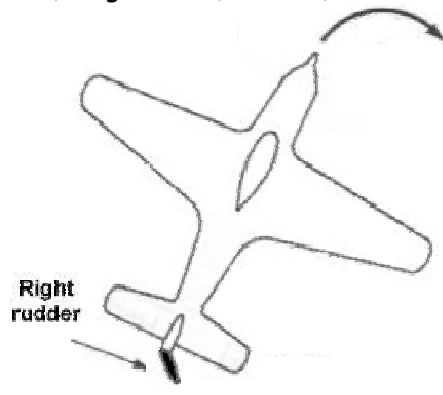
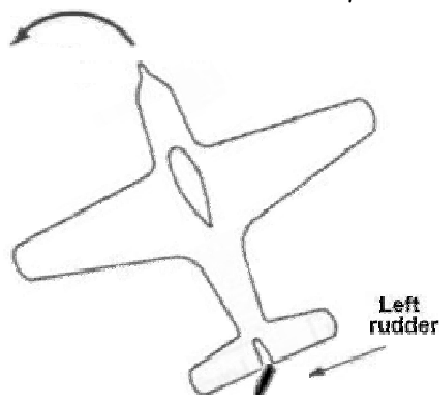
Elevators

This is a moving part attached to the vertical section of the tail. When moved, it makes the airplane turn to the left or to the right.



Rudder

These are moving parts attached to the horizontal section on each side of the tail. When moved, they make the airplane go up (climb) or go down (descend).

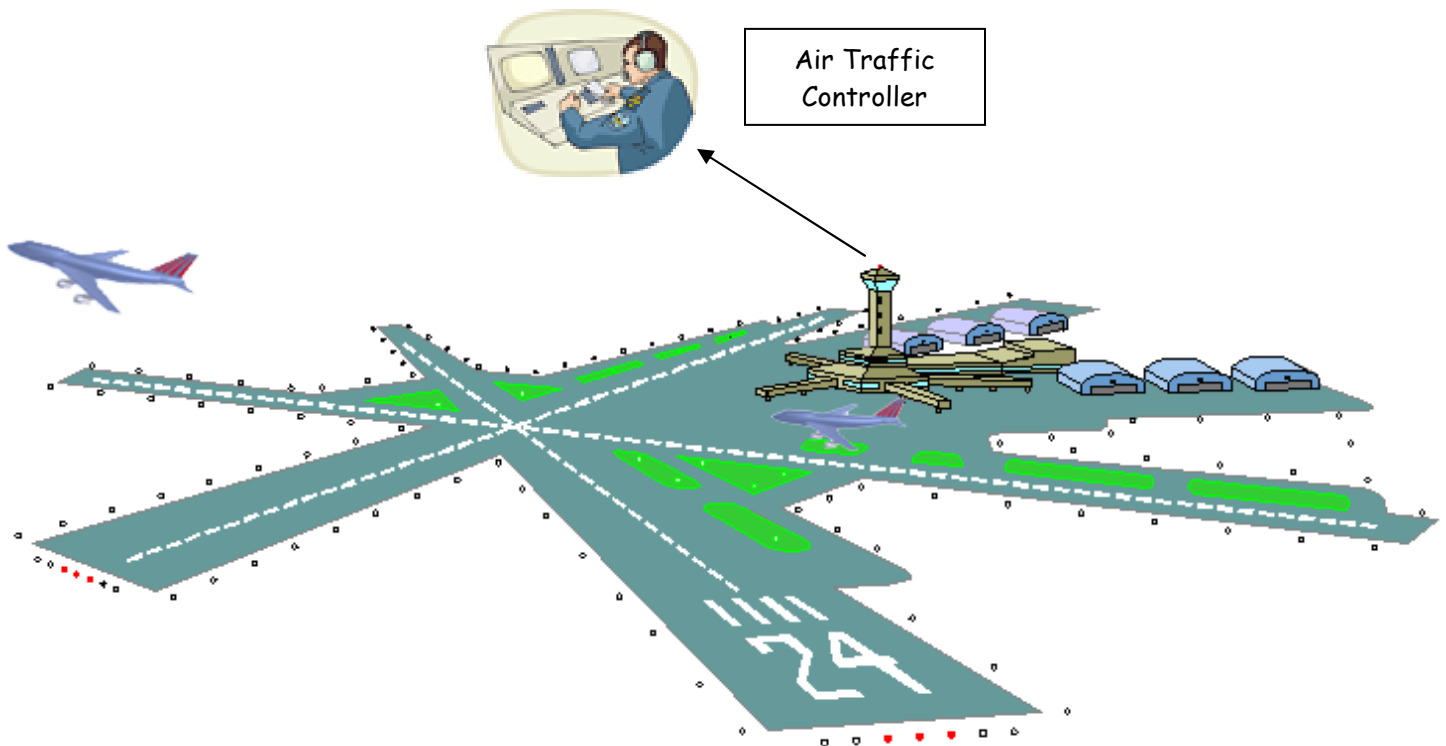


Where do Airplanes take-off and land?

>> Airport

Just like the school bus has stops to pickup and drop off passengers, so does an airplane -- these are called airports. An airport can be small with only a few private airplanes, or very large such as San Francisco International Airport which serves thousands of people every day from all over the United States and the World.

Because there are many airplanes flying at the same time, Pilots must follow flying rules in the sky, just like a car driver follows the rules of the road. People at the airport, called Air Traffic Controllers, tell the Pilot where to go when their airplane enters or leaves from a busy airport.



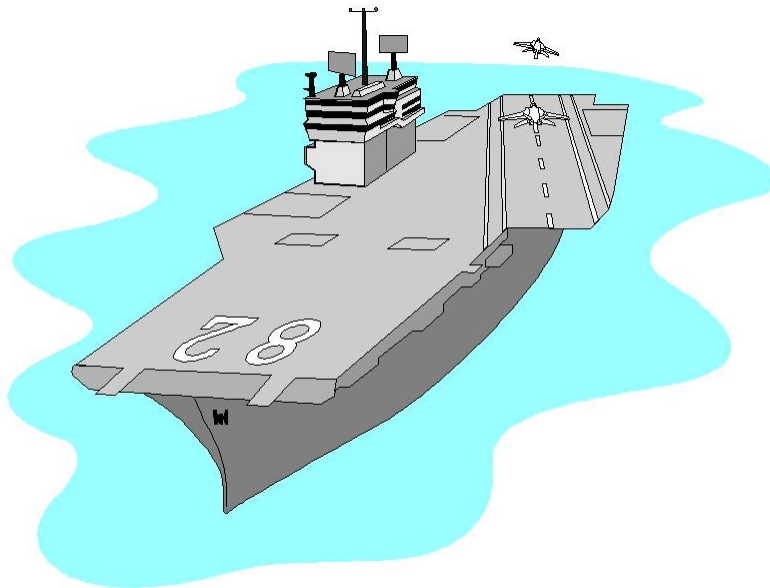
What you don't have an Airport?

>> Aircraft Carrier

The Oceans are a wide open space with no place to put an airport -- so the Aircraft Carrier was invented as a "floating airport" and holds everything and everyone needed to fly and fix the airplanes. Because the runway is so much shorter than an airport runway, airplanes need special equipment to help them take-off and land.

On take-off...

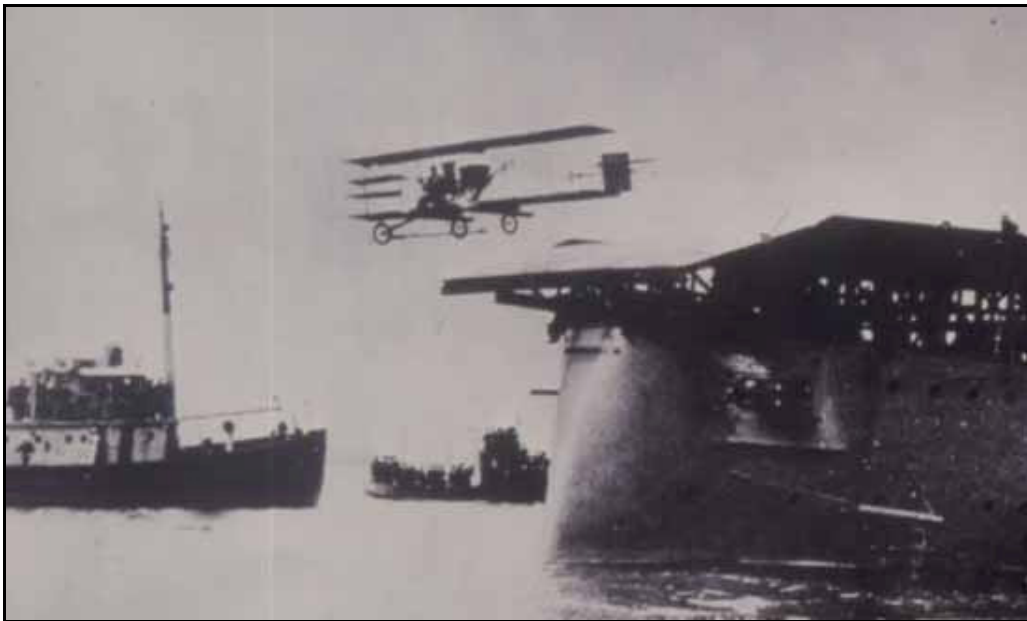
A steam powered catapult pulls the airplane very fast -- and along with the full power of the engine, launches the airplane into the air.



On landing...

The Pilot slows the airplane down and lowers the "tailhook" that is used to catch one of the wires stretched across the deck. If the Pilot does not catch the wire he must speed up and take-off again, or in an emergency, the airplane can be trapped in a very strong net stretched across the deck.

Did you know that the first take-off and landing on a ship was done right here in San Francisco Bay? A pilot named Eugene Ely, flying a Curtiss Pusher airplane, made a landing and take-off from the U.S.S. Pennsylvania in 1911. This marked the beginning of carrier aviation.



What you don't have an Airport or Aircraft Carrier?

>> Seaplane

Another type of airplane can even take-off and land on the water -- these are called Seaplanes or Floatplanes.



PBY-5A Catalina

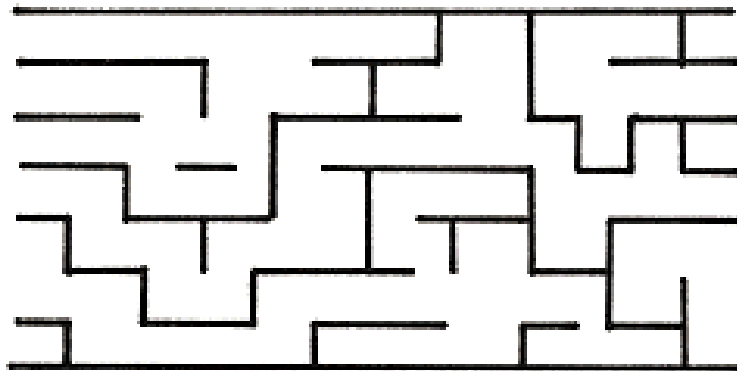
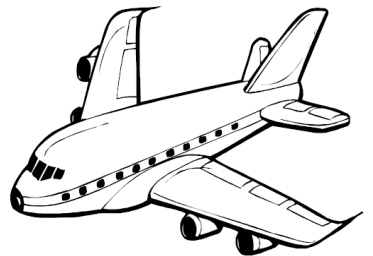
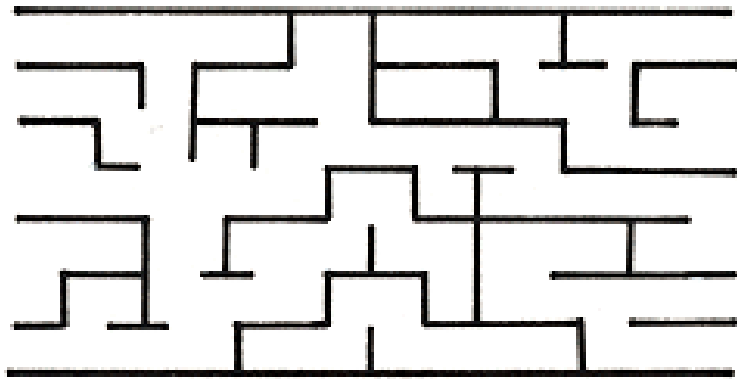
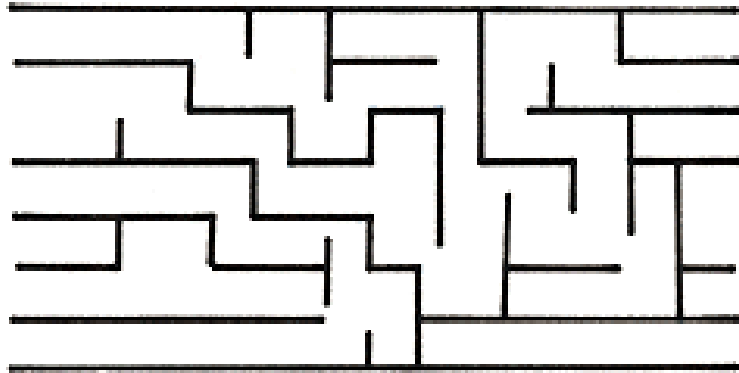
Back in the 1930's, seaplanes called "China Clippers" flew from right here in Alameda all the way to Hawaii and China. Our Alameda Naval Air Museum building was the airport for these China Clippers and other seaplanes!



Boeing 314 "China Clipper"

Activities

>> Help the Pilot find his Airplane!



Activities

>> Find these hidden words

AILERON
ELEVATOR
FUSELAGE
PROPELLER

AIRPLANE
ENGINE
JET
RUDDER

COCKPIT
FLAPS
PILOT
WING

N O R E L I A N U F T E
S P A L F W I N G U I N
E Q J E T W U A P S P A
R E D D U R O I E E K L
R E L L E P O R P L C P
E N I G N E E S H A O R
D A H T O L I P N G C I
E L E V A T O R R E V A