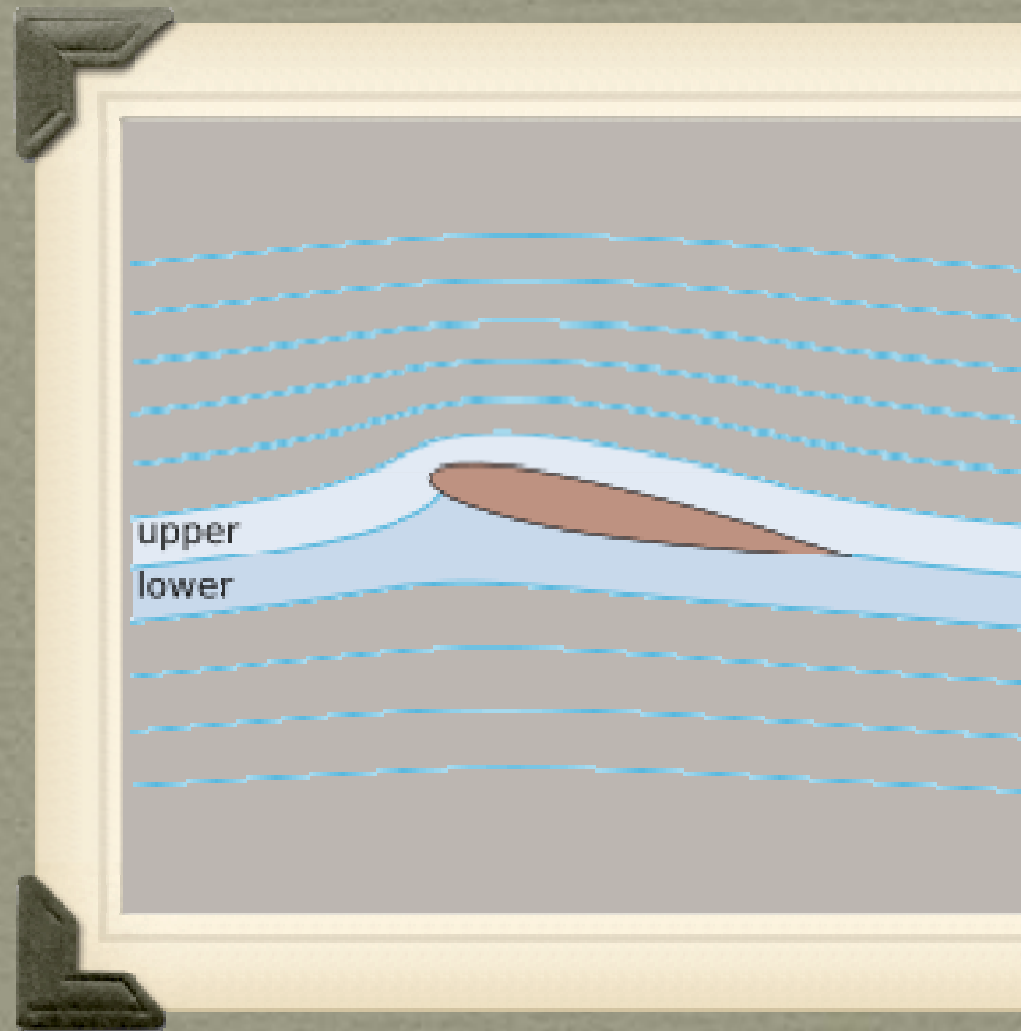


# Airplane Design

# Wondered How a Planes Flies?

All about LIFT!

is a mechanical force  
generated by a solid  
object as it moves  
perpendicular through a  
fluid (e.g. an airplane  
through air)

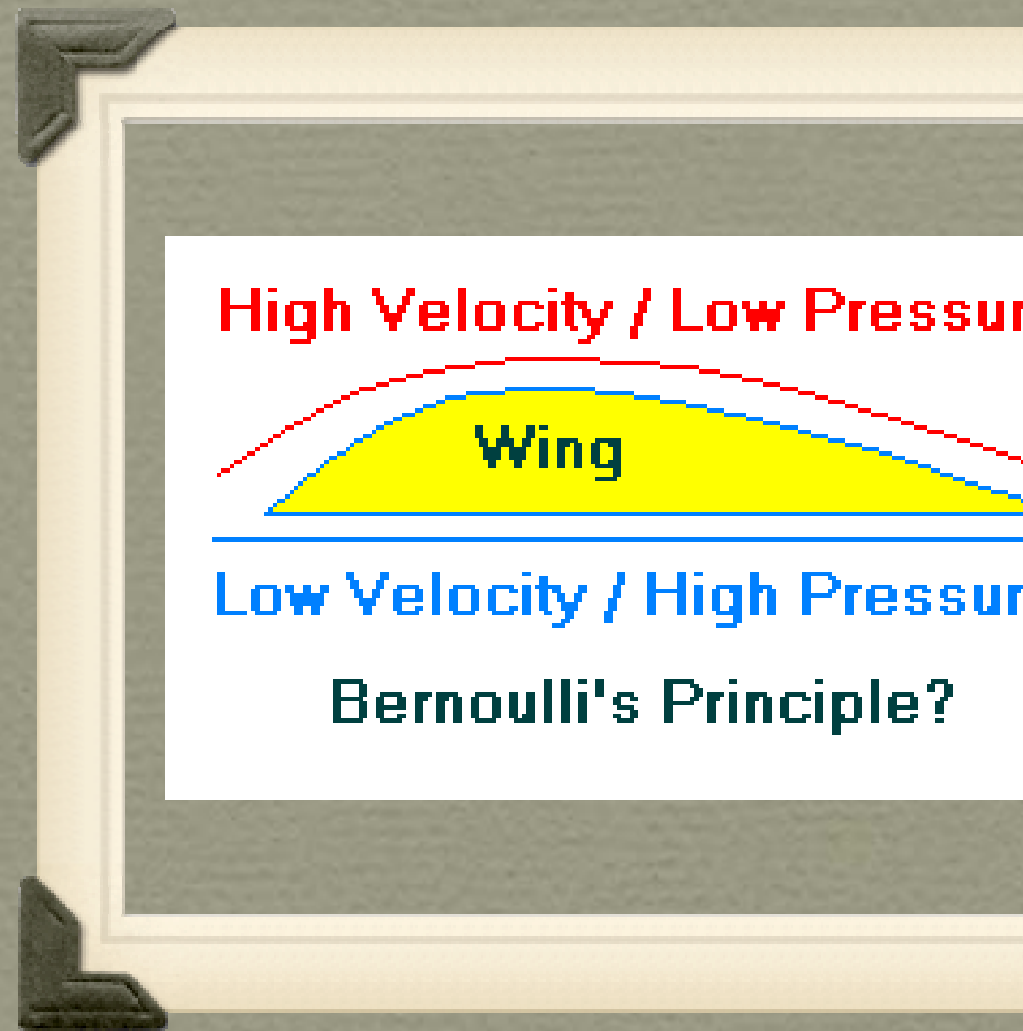


# Conservation of Mass & Bernoulli

## Principle

fluids will always get  
from point "A" to point  
B in the same amount  
of time.

As the speed of the fluid  
changes the pressure.  
FASTER air movement  
LESS pressure





# Three Keys to Flying

1 Air current splits. Part of air current travels over top of wing, part of air current travels under wing. Both air current sections will get to end of wing at same time.

2 Top of wing is longer distance for air current to travel across. The air must move faster than section of air under wing to get to end of wing at same time.

3 The faster air traveling above the wing has lower pressure than the slower air moving beneath wing. The greater pressure under the wing

about to get you

# thinking

Explanation of lift is simplified and very basic  
There are many forces acting on the airplane's wing  
There are additional concepts to consider:

The air flowing off the end of wing travels  
downward.

The air stream does not meet again perfectly  
behind the wing.

Complicated Fluids Dynamics...many people  
spend their entire career studying the air flow  
movement around airplane wings



can be?!



# Flight Innovators

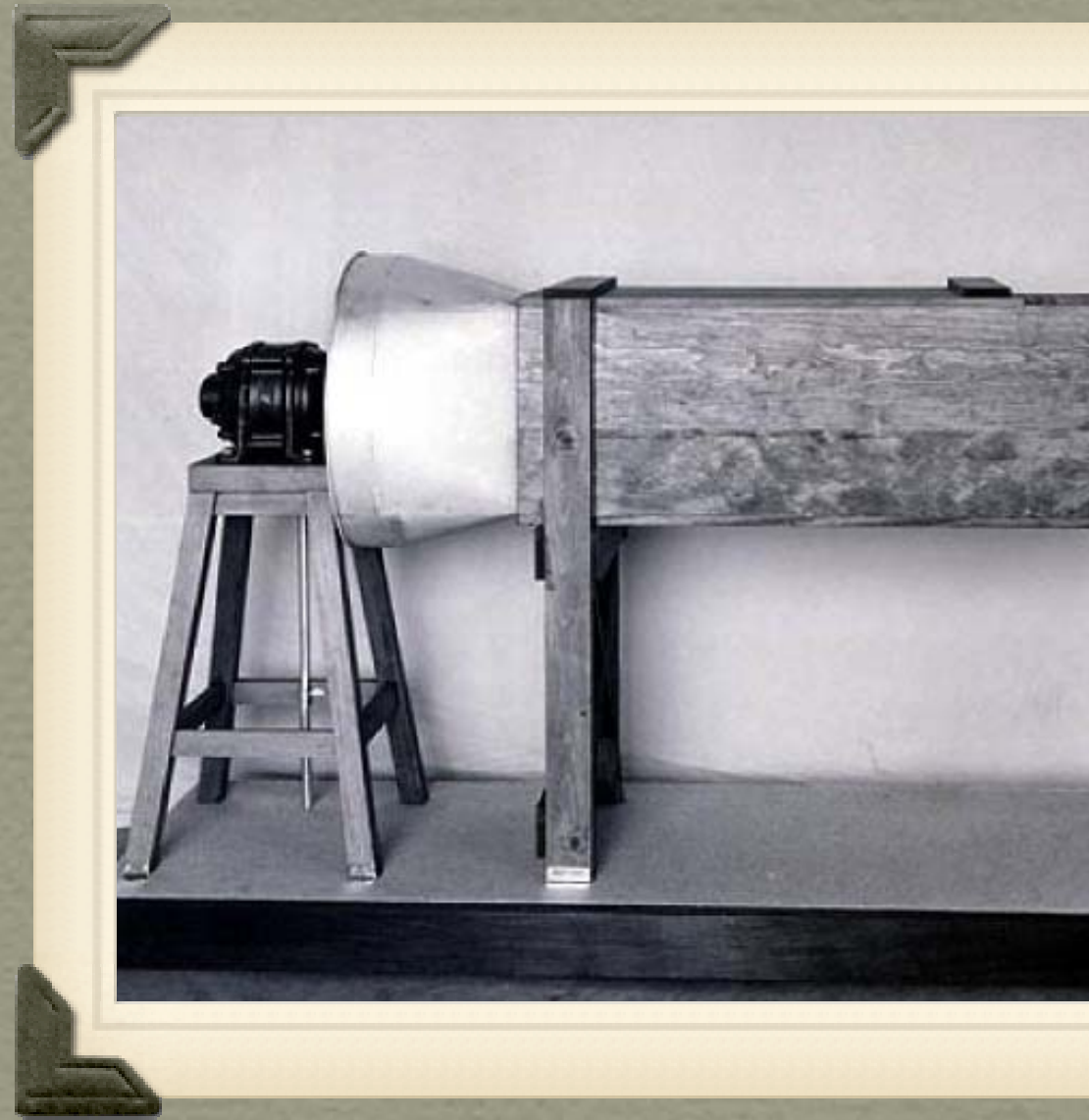
QuickTime™ and a  
Animation decompressor  
are needed to see this picture.



# Wing Designs

Wright Brothers tested at several different cross sections wing designs to determine the best design.

Wright Brothers tested the effectiveness of their wing designs in their own wind tunnel.





You get to follow in the  
foot steps of the Wright  
Brothers!!!

All design your own plane & test it in a wind  
a couple tips to help you with your airplane c

# Wing Cross Sections

Wing shape effects an airplane's take off. Designers also pick a wing shape that enhances the plane's overall design.

Good Stability. Good for Personal Aircraft and Training Planes.



Good For Transport, Freighters and Bomber Planes.



Good For Racing aircraft, Fighters and Intercept Planes.



Good Stall Characteristics - Very Safe



Good Stability. Good for Personal Aircraft and Training Planes.



Good For Transport, Freighter and Bomber Planes.



# Angle of Attack

Angle of attack refers to the angle of the wing relative to the oncoming flow. If any wings are not parallel to the ground - angle of attack may increase lift forces.





# Body of Airplane

The body of an airplane is aerodynamic (skinny and long) to limit drag forces.

The tail of the airplane keeps the plane upright. The plane should not tip forward or backward at a severe angle.



## THE MD-83 STABILIZER

The stabilizer on the MD-83 has pivoting wings and is mounted on top of the vertical tail fin of the aircraft. The horizontal stabilizers help control the pitch of the plane's nose during flight.



Stabilizer trim tabs located on the horizontal stabilizer help adjust the wing's air flow. The pilot trims the stabilizer via a wheel in the cockpit.