History of Flight

Lapbook

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Designed by
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History of Flight Lapbook

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Special thanks to Albert Aguilar, who is the author of the Study Guide that is included in this product. The Study Guide is being used with his permission and is now owned by Knowledge Box Central.

How do I get started?

First, you will want to gather your supplies.

***** Assembly:**

Folders:** We use colored file folders, which can be found at Walmart, Sam's, Office Depot, Costco, etc. You will need between 1 and 4 file folders, depending on which product you have purchased. You may use manila folders if you prefer, but we have found that children respond better with the brightly colored folders. Don't worry about the tabs….they aren't important. Within this product, you will be given easy, step-by-step instructions for how to fold and assemble these folders. ***If you prefer, you can purchase the assembled lapbook bases from our website.

***Glue:** For the folder assembly, we use hot glue. For booklet assembly, we use glue sticks and sometimes hot glue, depending on the specific booklet. We have found that bottle glue stays wet for too long, so it's not a great choice for lapbooking. For gluing the folders together, we suggest using hot glue, but ONLY with adult supervision. These things get SUPER hot, and can cause SEVERE burns within seconds.

***Other Supplies:** Of course, you will need scissors. Many booklets require additional supplies. Some of these include metal brad fasteners, paper clips, ribbon, yarn, staples, hole puncher, etc. You may want to add decorations of your own, including stickers, buttons, coloring pages, cut-out clipart, etc. Sometimes, we even use scrapbooking supplies. The most important thing is to use your imagination! Make it your own!!

Ok. I've gathered the supplies. Now how do I use this product?

Inside, you will find several sections. They are as follows:

1. **Layout and Pictures:** This section gives instructions and diagrams that will tell the student exactly how to assemble the lapbook base and where to glue each booklet into the base. Depending on the student's age, he or she may need assistance with this process, especially if you choose to allow the student to use hot glue.

2. **Student Instruction Guide:** This section is written directly to the student, in language that he or she can understand. However, depending on the age of the child, there may be some parent/teacher assistance needed. This section will also tell the student exactly what should be written inside each booklet as he or she comes to it during the study, as well as telling the student which folder each booklet will be glued into.

3. **Booklet Templates:** This section includes ALL of the templates for the booklets. These have been printed on colors that will help to improve retention of the information presented, according to scientific research on color psychology.

4. **Teacher's/Study Guide:** This section includes a Study Guide that can be used to teach this subject. It includes all information for completing the booklets in this lapbook.

History of Flight Lapbook

Layout & Pictures

You will need 3 folders of any color. For each folder, you will fold both sides toward the original middle fold and make firm creases on these folds (Figure 1). Then glue the folders together along one flap (Figure 2).

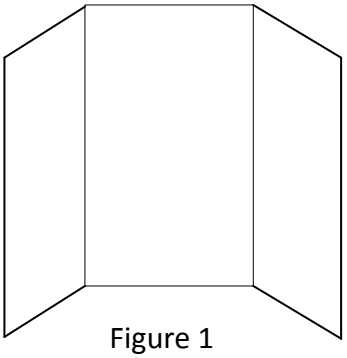


Figure 1

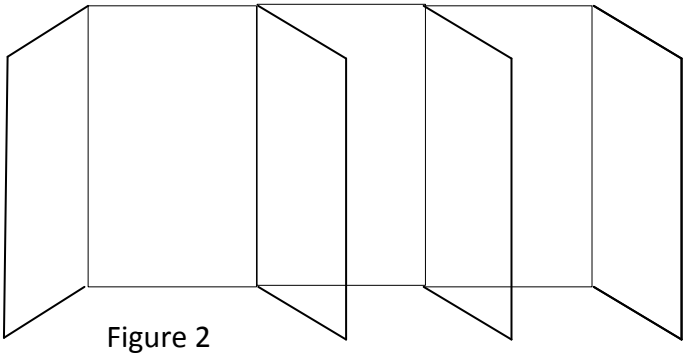
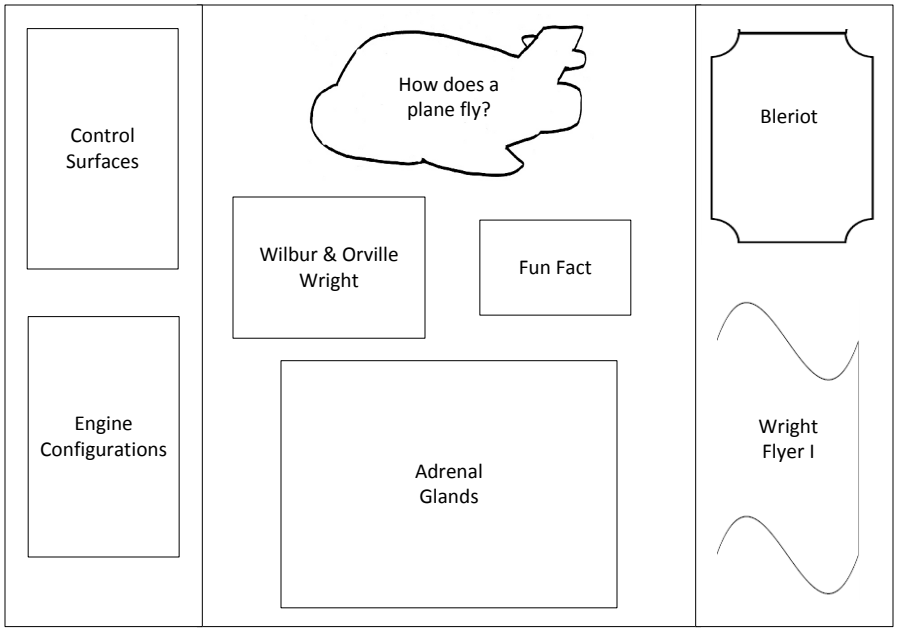


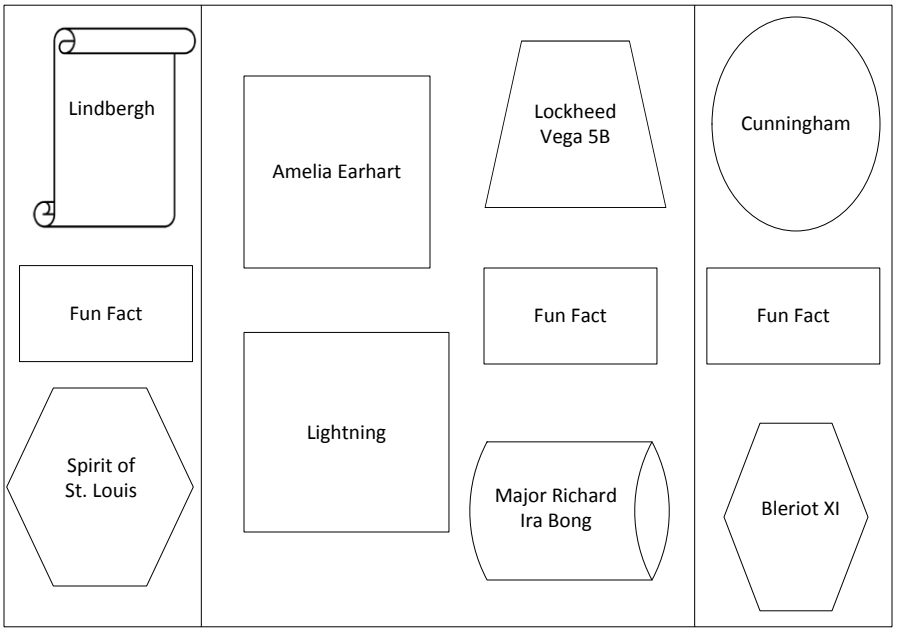
Figure 2

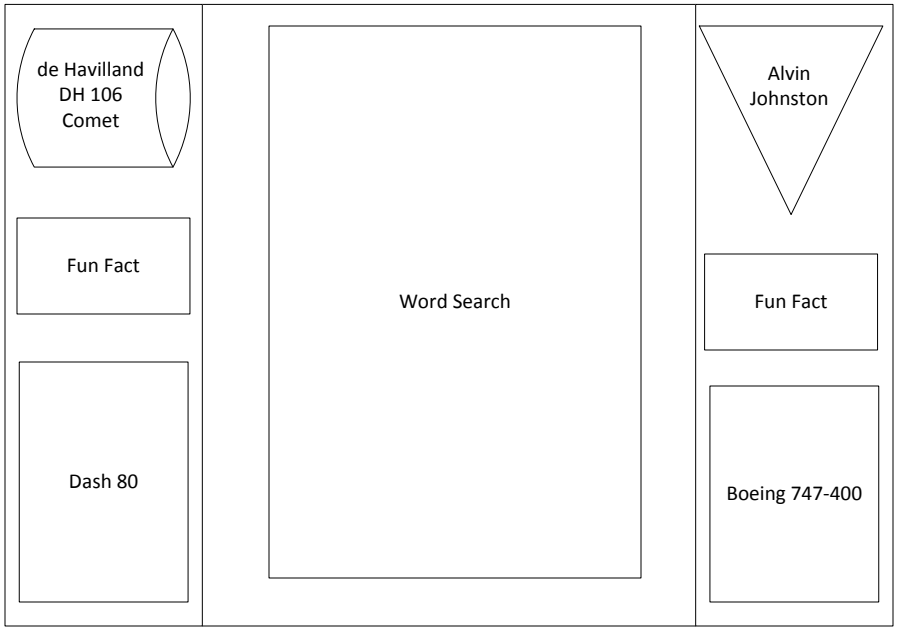
This is the "Layout" for your lapbook. The shapes are not exact on the layout, but you will get the idea of where each booklet should go inside your lapbook.



Folder 1

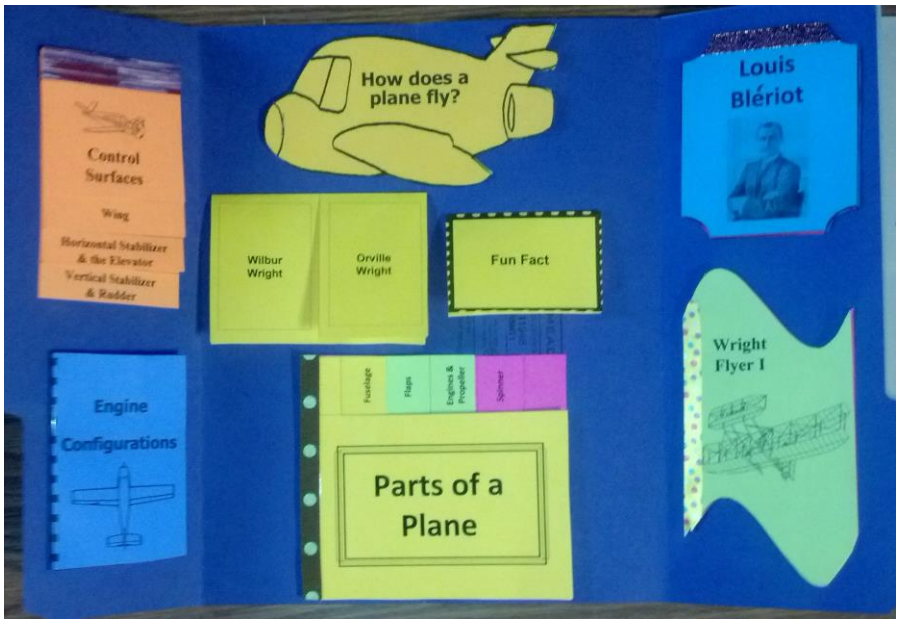
Folder 2





Folder 3

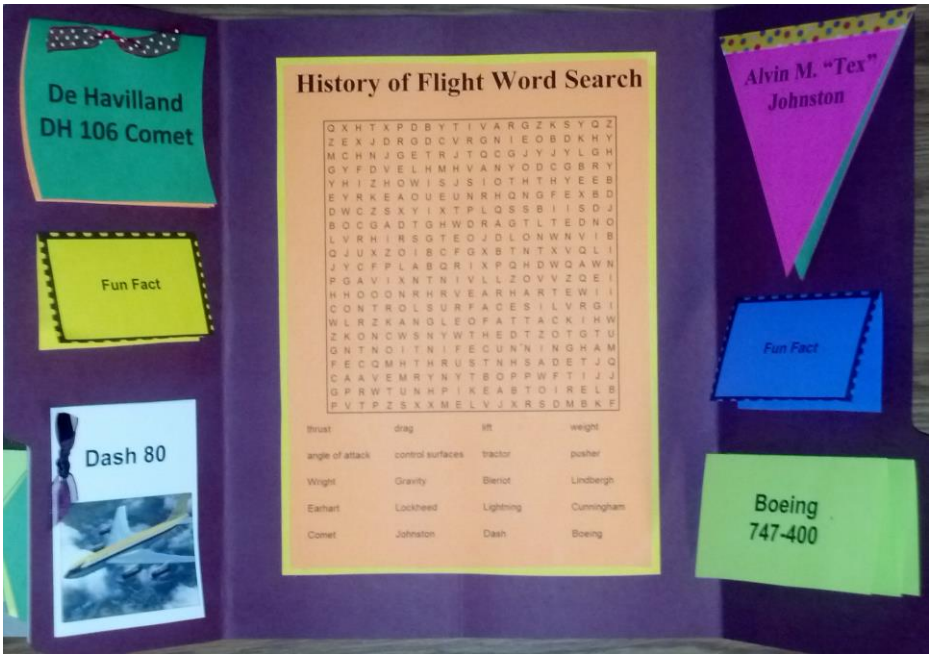
Below is a picture of a completed lapbook!!! This should help in figuring out how to assemble the booklets and then how to put them all together!



Folder 1

Folder 2

Folder 3



History of Flight Lapbook

Student Instruction Guide

Booklet 1: How Does a Plane Fly?

Assembly Instructions: Cut out along the outer black line edges of each page. Stack so that the title is on the front. Secure with a staple on the left side of the booklet.

Completion Instructions: Inside this booklet, tell about what makes a plane fly.

Booklet 2: Control Surfaces

Assembly Instructions: Cut out along the outer black line edges of each page. Stack so that the title is on the front and the pages get longer toward the back. Secure at the top with a staple.

Completion Instructions: Control surfaces affect the directional movement of the plane. Explain each one inside this booklet.

Booklet 3: Parts of a Plane

Assembly Instructions: Cut out along the outer black line edges of each page. Stack so that the title is on the front and the tabs get longer toward the back. Secure along the left side with a staple.

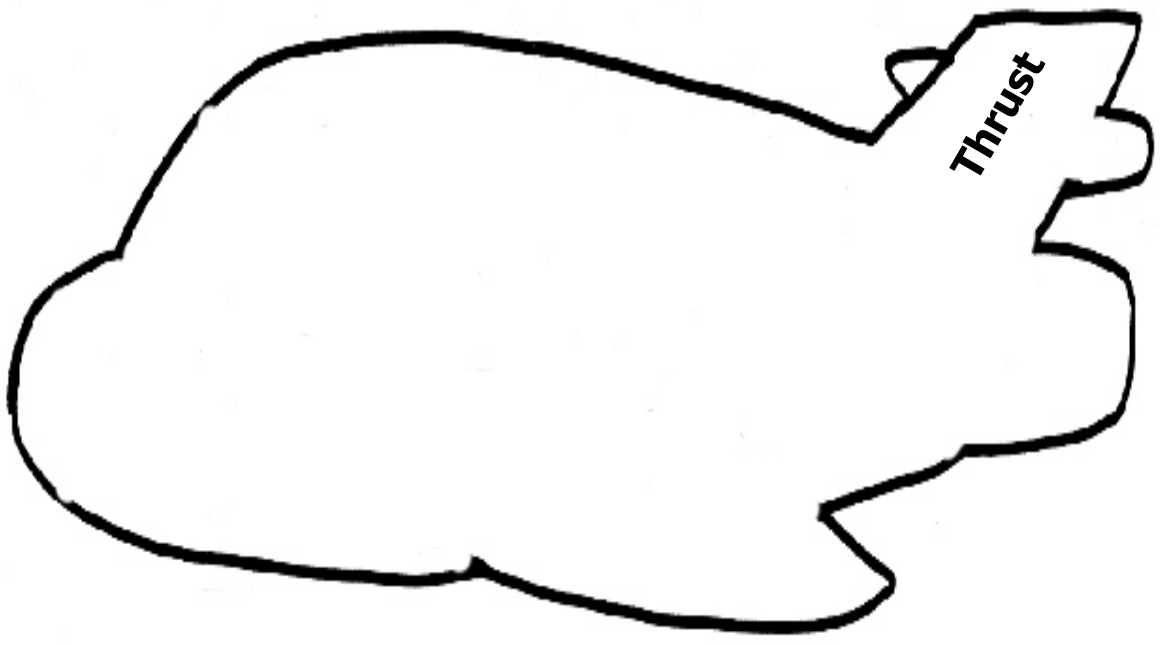
Completion Instructions: Inside this booklet, describe these parts of a plane.

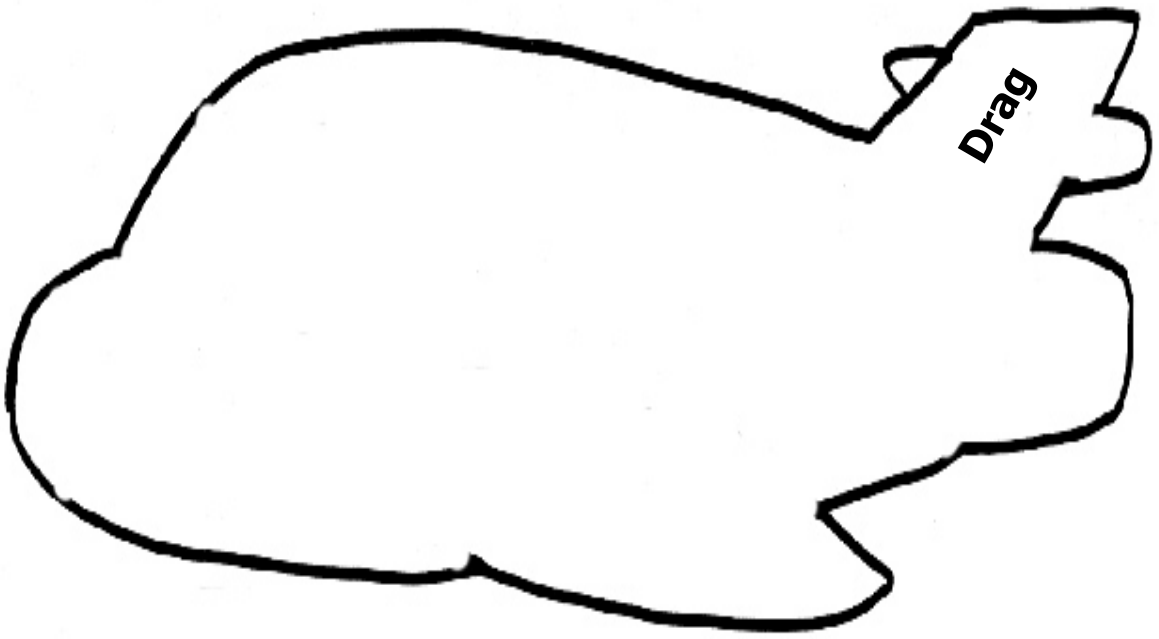
Booklet 4: Engine Configurations

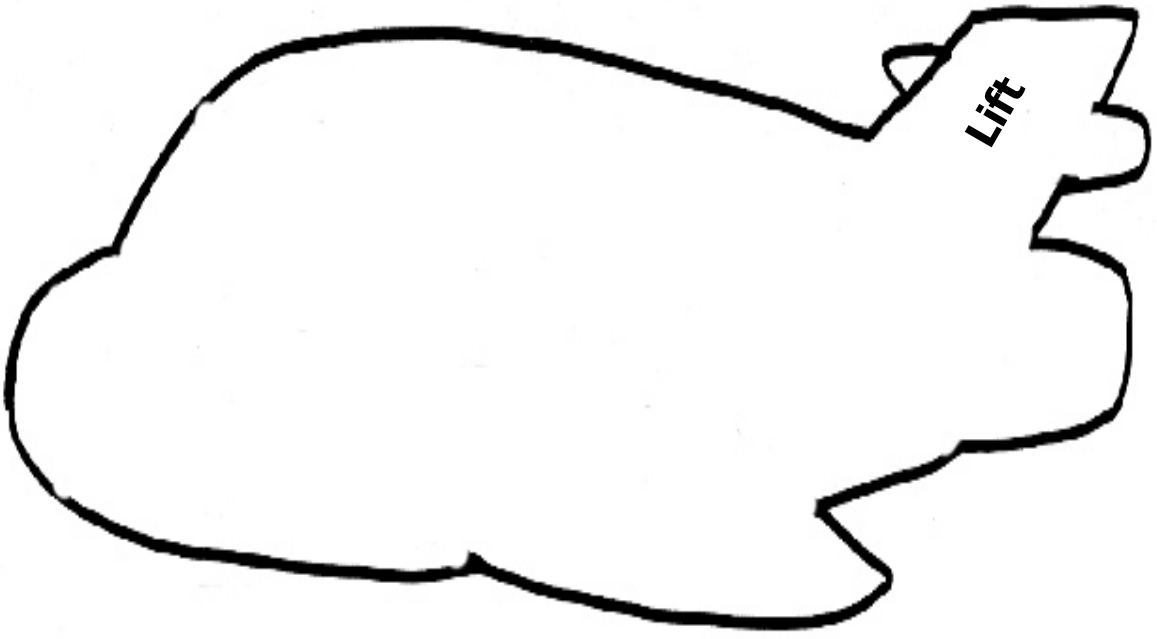
Assembly Instructions: Cut out along the outer black line edges of each page. Stack them so that the title is on the front. Staple along the left side.

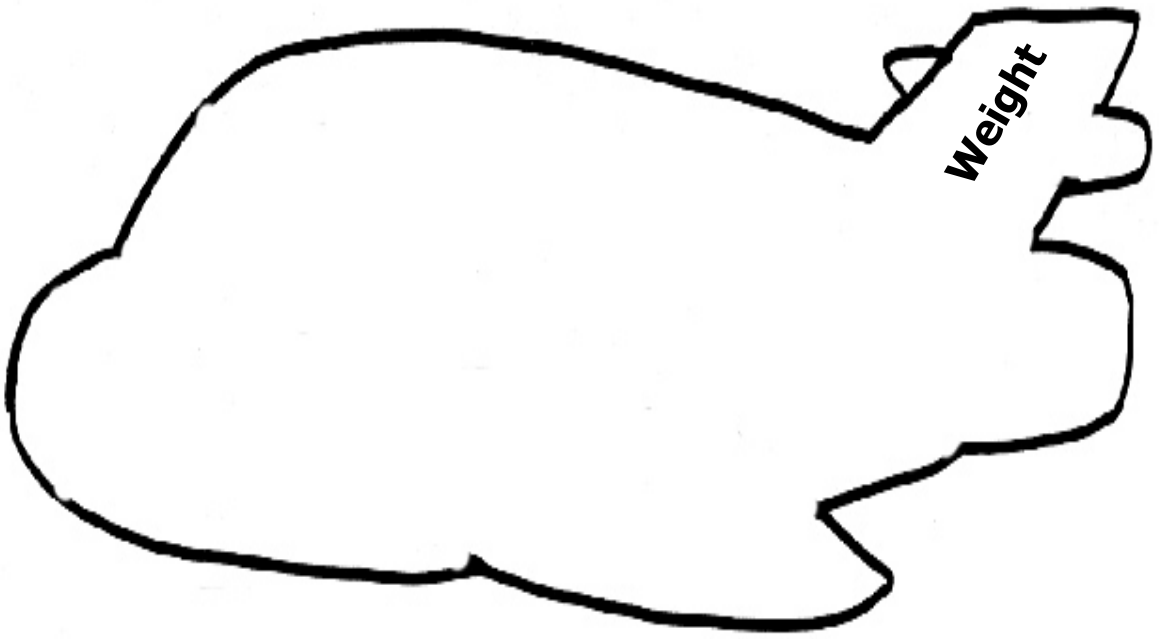
Completion Instructions: There are three different engine configurations on a conventional piston-engine plane. Describe them inside this booklet.

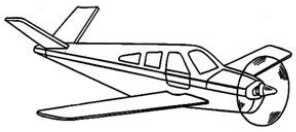
How Does a Plane Fly?




Drag


Lift


Weight



Control Surfaces

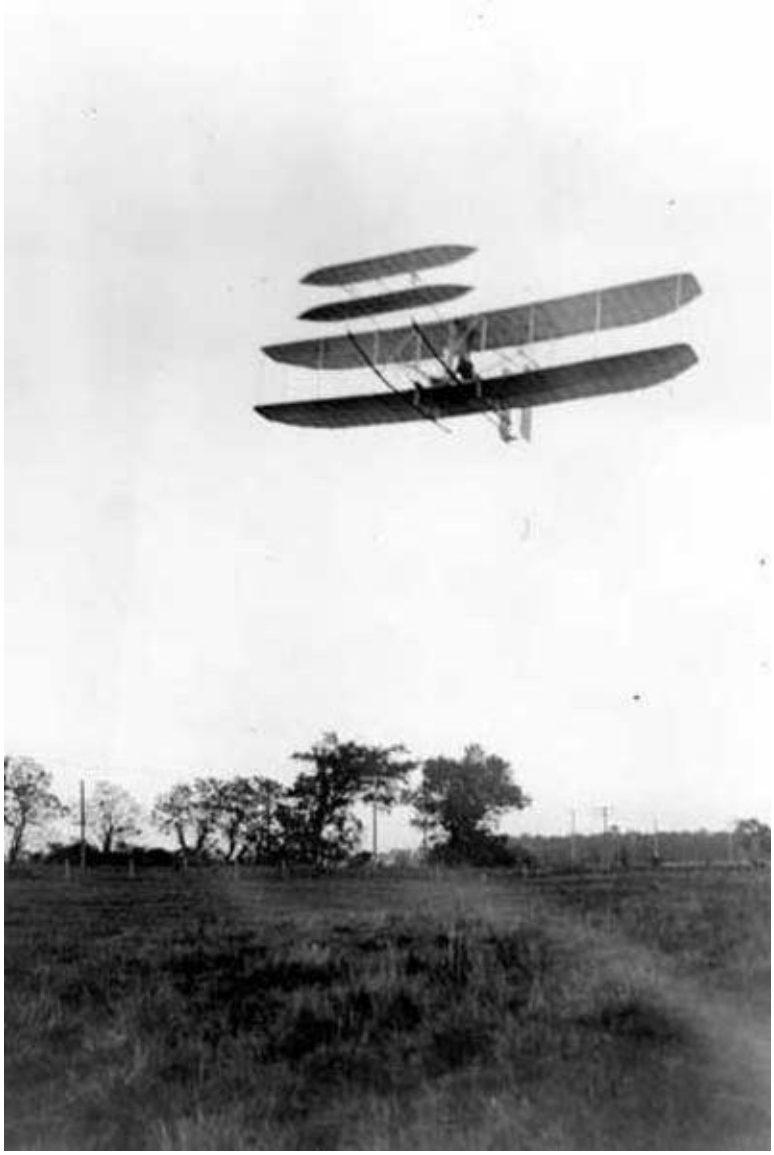
Wing

Horizontal Stabilizer & the Elevator

Vertical Stabilizer & Rudder

The History of Flight (Study Guide)

Written by Albert Aguilar



The Wright Flyer III over Huffman Prairie, circa 1903.

Photo from ***http://en.wikipedia.org/wiki/Wright_Flyer_III***

Introduction

It is the morning of December 17, 1903. In a collection of sand dunes known as Kill Devil Hills, near Kitty Hawk, North Carolina, two men and a strange-looking kite are about to change the course of the world in fifty-nine seconds. Wilbur and Orville Wright, two brothers from Dayton, Ohio who make and repair bicycles for a living, are going to see if their flying machine will actually put them in the air. After three fairly unimpressive "hops", they finally get the *Flyer* into the air for 852 feet, proving that a heavier-than-air craft is capable of sustained, controlled flights. The plane, which cost about $1,000 dollars to build and is made of spruce wood, muslin, and mild steel, is damaged beyond repair after it is blown over after the last flight.

Now let's fast-forward to 2013. A turboprop passenger plane rolls out of a concrete and steel hangar that is protected by a high-tech security system onto the tarmac of a multimillion dollar airport. The plane, which costs somewhere in the neighborhood of $1- 2.5 million, is controlled by veritable maze of computer avionics, GPS systems, and hydraulic systems. The pilot is able to instantly communicate with the control tower and air traffic controllers in his flight path if he has to make an emergency landing. In the control tower, a radar system keeps track of every aircraft within its range, and controllers will alert aircraft if they are about to collide.

How did aircraft go from wood and cloth to jets and computers in just one hundred ten years? In this study guide, we're going to take a look at how aircraft were developed, some of the most important aircraft designers and pilots, and the impact that aircraft have had on our society.

Pilots, man your planes!

How does a plane fly?

Before we start discussing the designs and designers of aircraft, let's take a look at what makes a plane actually fly- and why flying a plane is so much more complicated than driving a car. A plane has four forces acting on it that designers must work with or against- **lift**, **weight**, **thrust**, and **drag**.

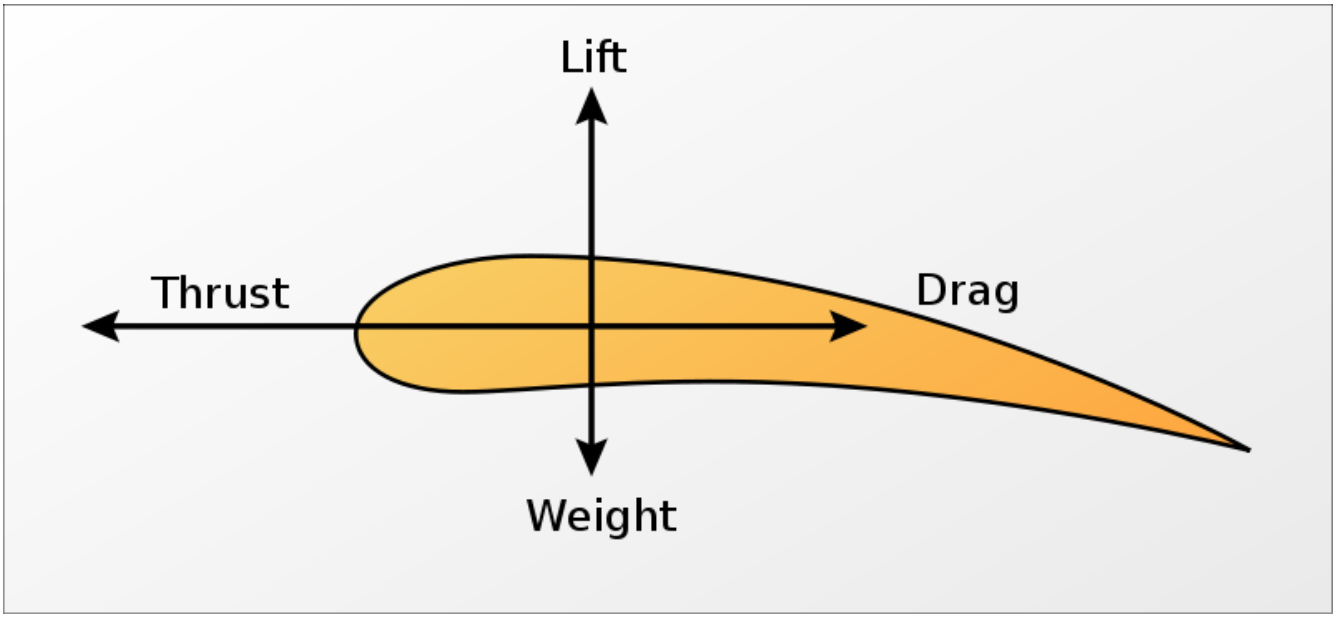


Illustration 1: ***http://en.wikipedia.org/wiki/File:Aeroforces.svg***

Thrust is the force that moves the plane forward. This force is provided by the plane's engine. **Drag** is caused by air pushing against the plane, which cancels out some of the thrust, slowing the plane down. **Lift** is the cushion of air created under the wing. A plane's **weight** causes the forces of gravity to act on the plane, pulling it earthward.

There are many theories as to what actually causes **lift**, but for the purposes of this guide, we'll define lift as: "The effect caused by a body of air under high pressure pushing against the bottom of the wing surface, thereby forcing it upwards into an area of lower pressure". What causes these pressures? As you may have noticed, a plane's wing is curved. When the wing moves through the air, the air splits into two streams, one stream flowing above and one flowing under the wing. Air flowing under the wing is slowed down and trapped by the trailing edge of the wing, which forces the air backwards and up. Air flowing over the wing is not under pressure, however, since there is nothing to impede the flow. In fact, since the top of the wing is curved to deflect air down and off the wing surface, the top flow of air is actually under less pressure than it was before it was diverted by the wing. This makes it easier for the air under the wing to "lift" the wing upwards.

Drag is harder to explain, so we'll just consider it to be the force of air pushing against the plane. For a quick look at what effect lift and drag would have on the surfaces of an airplane, you'll need a piece of cardstock or lightweight cardboard about 14"x7", and a floor fan. Hold the cardboard in one hand on the shorter side, slightly tilted upwards, in front of the fan. Hold the cardboard lightly, where it can move freely, but don't drop it. Turn the fan on high. You should feel the cardboard start to lift upwards. Try tilting the "wing" further up. The wing will gain more and more lift, but as the **angle of attack** is increased (as the wing becomes more in line with the "y" axis, if you want to imagine the wing as an "x" axis), it will start to be blown backwards instead of up, as pressure from the wind

pushes against it. Now imagine that wind is moving under the wing at 300 mph- that would generate a lot of lift! But also imagine that same 300 mph wind hitting a flat surface- that would also generate a lot of drag, unless we make that flat surface rounded, allowing the air to flow to the sides. That is one of the main reasons why the surfaces of commercial aircraft are rounded, especially the nose and the leading edges of the wing.

Now that we know what makes a plane fly, and how we can design them to fly more efficiently, it's time that we turn our attention to the **control surfaces** of a plane.

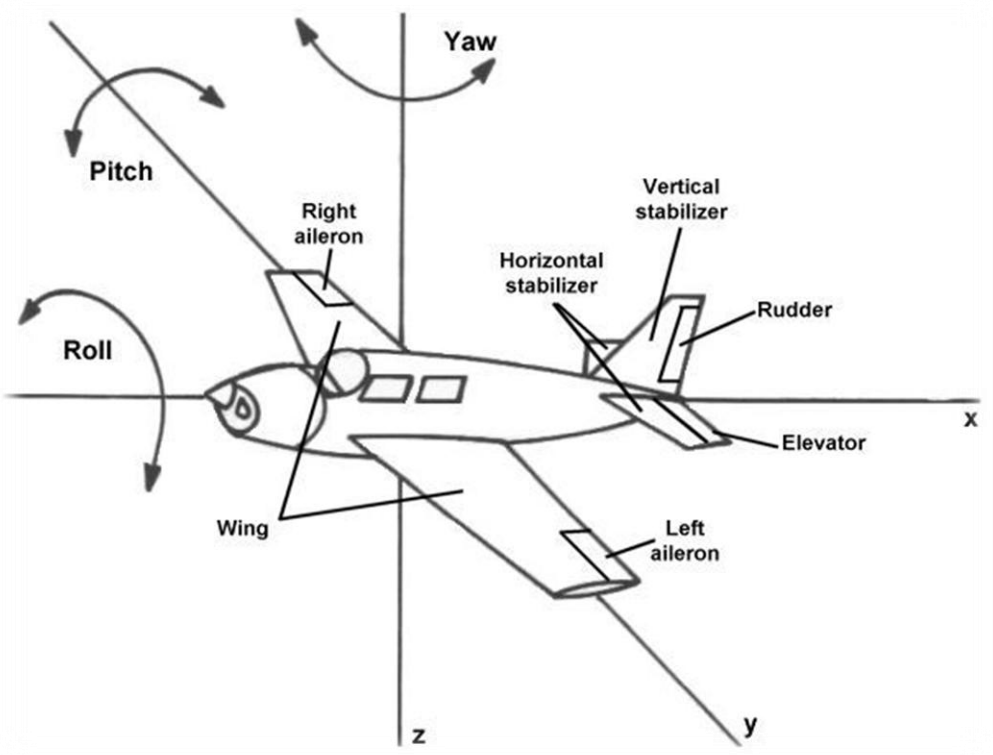


Figure 1:Illustration from ***http://www.aerospaceweb.org/question/design/q0101.shtml***

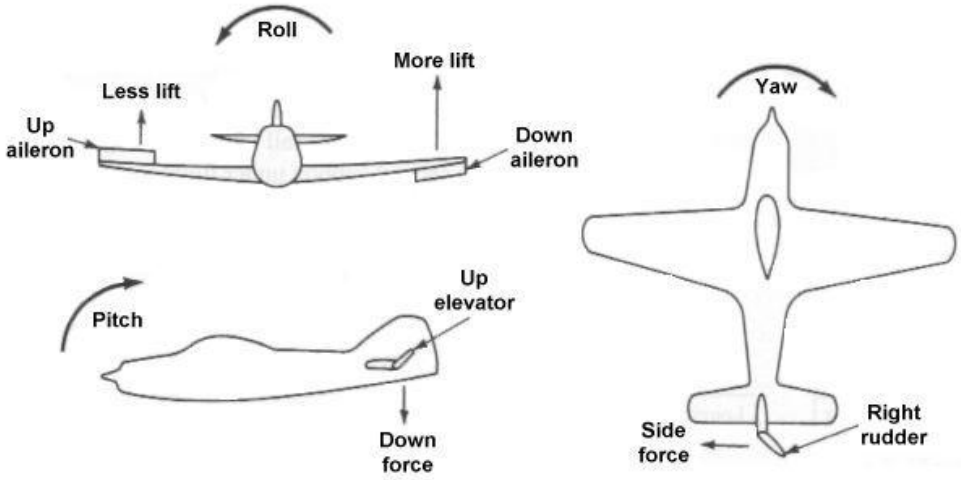


Figure 2: Illustration from ***http://www.aerospaceweb.org/question/design/q0101.shtml***