

THE WORLD'S LOUDEST CLASSROOM

HISTORY. SCIENCE. INSPIRATION.

The Lone Star Flight Museum combines STEM education and history in an immersive aviation-based experience.

- ★ The **Aviation Learning Center** offers application of **STEM principles** with **flight simulators**.
- ★ **More than 20** rare **military, commercial** and **historically significant** aircraft.
- ★ **130,000** square feet of **galleries, aircraft** and **science-based** experience.



LONE STAR
FLIGHT MUSEUM
HOUSTON, TEXAS

346-708-2517

11551 AEROSPACE AVE
ELLINGTON AIRPORT
LONESTARFLIGHT.ORG

STEM – CRITICAL THINKING – CONTINUOUS GROWTH...THAT'S OUR FOCUS

The Educational Programs at LSFM are designed to assist in TEKS-based learning, apply science and math concepts to real world scenarios, and help build upon the confidence and character of our young people.

OUR PROGRAMS:

- ★ Offer STEM-based subject matter experiences
- ★ Explore the history of Texas aviation
- ★ Introduce the science and wonder of flight
- ★ Engage students in math and engineering concepts
- ★ Tour rare and historically significant aircraft
- ★ Encourage and inspire careers and futures in aviation

STUDENT FIELD TRIPS / EXPERIENCES

NEW Discounted Rates: \$5.00/student for 100+ student groups, \$8/student for smaller groups

Self-Guided Tour: Use the Activity Guides for lesson focused content.

Docent-Led Tour: History and design of our warbirds. (Up to 80 people).

ALL OF THE FOLLOWING INCLUDE FULL MUSEUM ACCESS:



Aviation Learning Center: (10-60 students per 2-hour session)

\$10 per student for Title I Schools, \$12 per student for non-Title I Schools

Pilot Experience: (10-20 students per one-hour session).

\$10 per student for Title I Schools, \$12 per student for non-Title I Schools

Learning Lab: (10-20 students per one-hour session).

\$10 per student for Title I Schools, \$12 per student for non-Title I Schools

Teacher Resources: FREE! Pre, during and post field trip curriculum. STEM focused with Math, Science, Language Arts, and Social Studies

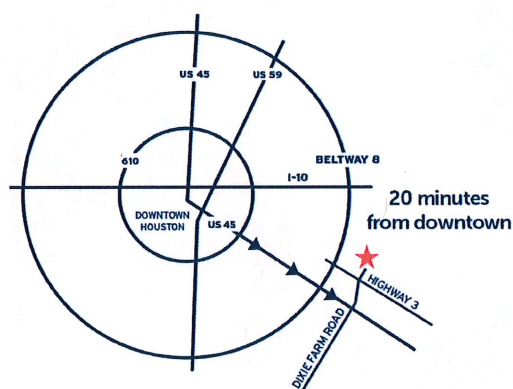
Contact our Education Team for more information/details: EDUCATION@LONESTARFLIGHT.ORG

Or Reserve Your Class Now! LONESTARFLIGHT.ORG/FIELDTrips



**LONE STAR
FLIGHT MUSEUM**
HOUSTON, TEXAS

LoneStarFlight.org



11551 Aerospace Avenue, Houston, TX 77034 ★ (346) 708-2517



LONE STAR
FLIGHT MUSEUM
≡ **HOUSTON, TEXAS** ≡

What is a field trip like at the Lone Star Flight Museum?

If these planes could talk...the stories they would tell. Our Warbirds represent the women that built them and the men that flew them, all heroes as the country unified to stop evil. Museum volunteers and staff partner with visiting educators to give students a full experience. All students get an introductory briefing to give context to the exhibits. Other presentation such as jobs in aviation, innovators and leaders, and a video summary of the history of flight can be included in the visit. Our volunteer School Guides are available in the hangars and exhibits to answer questions, discuss the design of the planes and tell the historic stories. The Aviation Learning Center gives a complete introduction to the science and excitement of flight.



Scan the code with a
smartphone camera to
learn more about the ALC.

TEKS CONTENT

The Heritage Gallery explores history of aviation and the Flight Academy is a hands-on demonstration of scientific topics.

HIST.6.B Significant Individuals of the 20's
HIST.7.A US Involvement in WWII
HIST.7.B Mobilization for War
HIST.7.D Major Issues of WWII
HIST.7.E Major Events of WWII
HIST.7.G Home Front & American Patriotism

HIGH SCHOOL FIELD TRIPS

INNOVATION, PAST & PRESENT

Aviation requires innovators and leaders to create, change, push, and challenge. The histories of the World Wars are intertwined with the innovations of aviation, making aircraft a sometimes-personal reminder of the stories of those that went to *"do our job and return the world to peace."* Each aircraft can be looked at as an engineered machine that must follow the rules of physics, or a reminder of the story of the people that built and flew it. Witnessing these aircraft firsthand can bring a greater appreciation and understanding of history, engineering, and innovation that won't be found in a textbook.

What's recommended for High School students?

I recommend the Aviation Learning Center to spark an interest in the field that could lead to a lucrative career. Reports show that the job outlook for aviation is very good with high pay. This program is a fun way to give students the full picture of aviation science knowledge and flight skills, all while prioritizes teamwork and communication. On our Teacher Resources web page, you'll find an activity to help students give their own tours and a post-activity ALC presentation template. For a raw look at the life of a B-17 gunner, Blum's Journal is excellent for classroom study.

James Talmage
VP of Education, LSFM

**THE FOLLOWING PAGES CONTAIN THE
DIARY OF MY LIFE IN THE SERVICE**

This simple record of my daily experiences and thoughts has given me pleasure in the writing of it. If for any reason it leaves my possession, I would like to have it forwarded to:

Name Adolph Blum
Address R.F.D. #1
City Camillus State N.Y.



May 5-43

Leaving Kearney, Neb.
This is the day we are to leave on our great adventure. When I say "we" I include only the other members of my crew, which are

Lt. J. D. Brady Pilot
Lt. H. H. Crosby Navigator
Lt. J. L. Hoerr Co Pilot
Lt. H. B. Hamilton Bombardier
S/Sgt. H. E. Clanton Asst. Engineer
T/Sgt. Saul Levitt Radio oper.
S/Sgt. R. D. Gangiver Asst. Radio
S/Sgt. G. J. Petrohelos Armorer Gunner
S/Sgt. J. A. McCusker Tail Gunner

We are going to war with the intentions of returning. Not to play the hero, not to win medals but to do our job and return the world to peace.

All actual heroes are essential men,
And all men possible heroes.

—E. B. Browning



Name Adolph Blum
Address R.F.D. #1
City Camillus State NY

May 5 - 43

Leaving Kearney, Neb. This is the day we are to leave on our great adventure. When I say "we" I include only the other members of my crew. Which are

Lt. J.D. Brady	Pilot
Lt. H.H. Crosby	Navigator
Lt. J.L. Hoerr	Co Pilot
Lt. H.B. Hamilton	Bombardier
S/Sgt H.E. Clanton	Asst. Engineer
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S/Sgt R.D. Gangiver	Assit Radio
S/Sgt G.J. Petrohelos	Armorer Gunner
S/Sgt J.A. McCusker	Tail Gunner

We are going to war with the intentions of returning. Not to play the hero, not to win medals but to do our job and return the world to peace.

Name _____

WWII Journal

Study Guide



Read the Journal of Adolph Blum, *My Life in the Service*. Read all entries and complete the questions and activities for each entry date. (Some answers are given in days before the dated question.)

May 5, 1943

What does the last paragraph of the entry mean to you?

June 2, 1943

Explain why Iceland is called "the land of the midnight sun".

Using context clues, what is "terra firma"? _____

June 10, 1943

Why would he think there was a raid?



LONE STAR FLIGHT MUSEUM ≡ HOUSTON, TEXAS ≡

What is a field trip like to the Lone Star Flight Museum?

Don't just come to the museum to look at planes – you'll miss the best part. *Use real-world statistics to compare acceleration of different planes. Small is quick, right? The data shows otherwise. Learn about the Doolittle Raiders and imagine riding in our B-25 off the deck of the USS Hornet on a dangerous and unknown mission.* Museum volunteers and staff partner with visiting educators to give students a full experience. We'll be with you through your entire visit. An introduction to the museum by staff will give context to the museum exhibits along with a video summarizing of the development of aviation. While touring the exhibits, volunteer School Guides host student visitors, answer questions, and challenge students to think more about what they are experiencing.

TEKS CONTENT

In our exhibit areas, the Heritage Gallery explores history of aviation and the Flight Academy is a hands-on demonstration of scientific topics.

SCI.6.8A Potential & Kinetic Energy
SCI.6.11.C Space Exploration
SS.7.7.E Impact of Major Events
SS.7.12.B Major Industries
SS.7.20.A Technology Past and Present
SS.7.20.B Leaders in Tech and Innovation
SS.7.20.C Discoveries and Innovations
SCI.8.6.C Newton's Laws
SCI.8.10.A Convection
SCI.8.10.B Atmospheric movement

MIDDLE SCHOOL FIELD TRIPS

CAREER FOCUS

Aviation is opportunity.

The list of jobs associated with aviation is almost endless. For a visit focused on creating that spark of interest in a career field, the Aviation Learning Center can be a fun introduction to what it is like to be a pilot as students learn the science and skills involved. Museum staff can give an overview presentation of all the jobs involved in flying, from initial aircraft design to taxiing to the gate. The Flight Academy gives a hands-on approach to the engineering involved in designing and building aircraft.



Scan the code with a
smartphone camera to
learn more about the ALC.

What's recommended for Middle School students?

Middle School is a critical time for students to examine their interests in career fields as they prepare for high school. I recommend the Aviation Learning Center to spark an interest in the field of aviation that could lead to a lucrative career. We can also do a short presentation to explain the wide variety of jobs in the field. Reports show that the job outlook for aviation is very good with high pay. There are several TEKS based Activity Guides on the Teacher Resources page of our web site. *F=ma* and *Texas Aviation History Timeline* are the most popular.

James Talmage
VP of Education, LSFM

Name _____



F=ma in Flight

Using the information displays for the plane, you will be able to calculate the acceleration of each plane. Isaac Newton determined that **Force = mass x acceleration (or acceleration = force/mass)**. The airplane displays will give you force in horsepower, and mass in pounds. These numbers will need to be converted to the scientific standard of Newtons and grams.

Vocabulary

Acceleration- increase in the rate or speed of something.

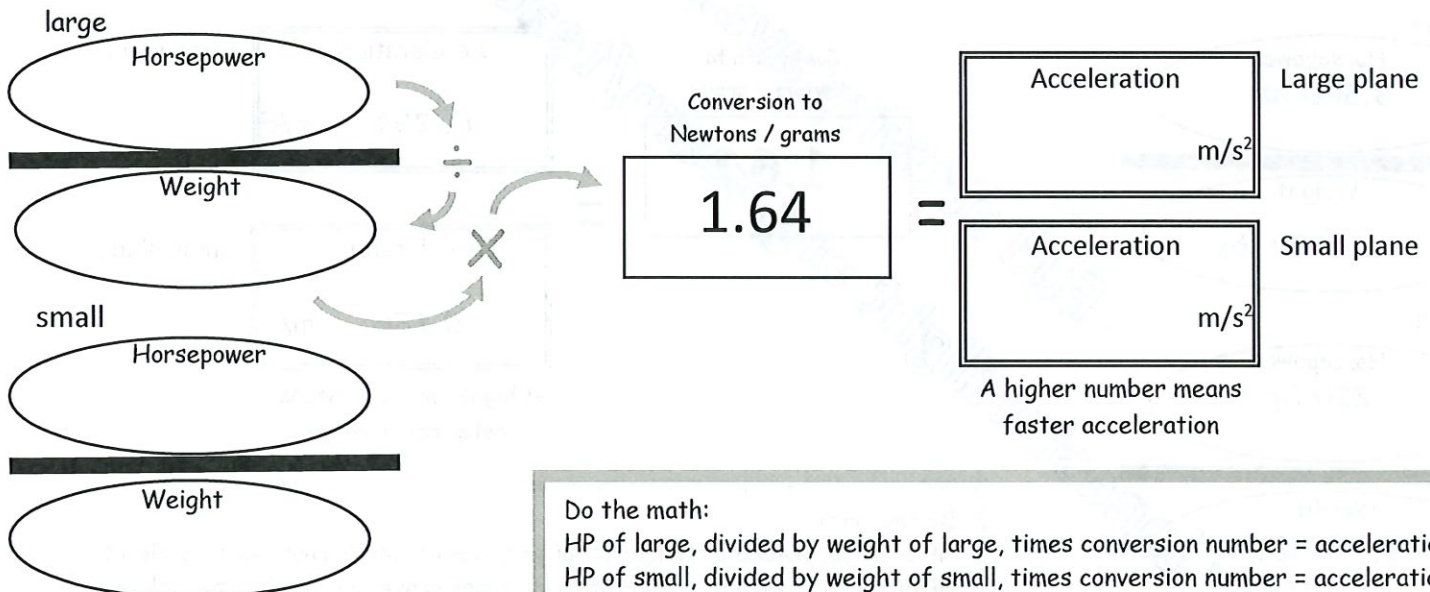
Horsepower – a measurement of mechanical force.

Claim

Pick a large plane and a small plane. Which plane do you think will be able to accelerate (speed up) faster? Remember, a heavier plane will accelerate slower, but a more powerful engine will make it accelerate faster. The ☐smaller ☐larger plane will accelerate faster because _____

Evidence

Name of large plane _____ Name of small plane _____



Do the math:

HP of large, divided by weight of large, times conversion number = acceleration.
HP of small, divided by weight of small, times conversion number = acceleration.

Reasoning

Do the results match your claim? Describe the size and power of each plane to explain the differences in acceleration.

Name _____



F=ma in Flight

Using the information displays for the plane, you will be able to calculate the acceleration of each plane. Isaac Newton determined that **Force = mass x acceleration (or acceleration = force/mass)**. The airplane displays will give you force in horsepower, and mass in pounds. These numbers will need to be converted to the scientific standard of Newtons and grams.

Vocabulary

Acceleration- increase in the rate or speed of something.

Horsepower – a measurement of mechanical power

Claim

Pick a large plane and a small plane. Which plane do you think will be able to accelerate (speed up) faster? Remember, a heavier plane will accelerate slower, but a more powerful engine will make it accelerate faster. The ☐ smaller ☐ larger plane will accelerate faster because smaller=less mass / larger=greater force

Evidence

Name of large plane B-25 Mitchell

Name of small plane Stearman PT-17

large

Horsepower
3,500 hp

Weight

19,480 lbs

small

Horsepower
220 hp

Weight

1,936 lbs

Conversion to
Newtons / grams

1.64

Acceleration

0.294 m/s²

Large plane

Acceleration

0.186 m/s²

Small plane

A higher number means
faster acceleration

Do the math:

HP of large, divided by weight of large, times conversion number = acceleration.

HP of small, divided by weight of small, times conversion number = acceleration.

Reasoning

Do the results match your claim? Describe the size and power of each plane to explain the differences in acceleration.

The larger plane has faster acceleration (0.294 m/s² is greater than 0.186 m/s²). Even though it has more mass than the smaller plane, it also has greater force because of the two large engines. A misconception is that big means heavy, and it is easy to forget about the increase in force from the two engines.

Name _____

Texas Aviation

History Timeline

Use the Heritage Gallery to complete the dates of each event in aviation history.

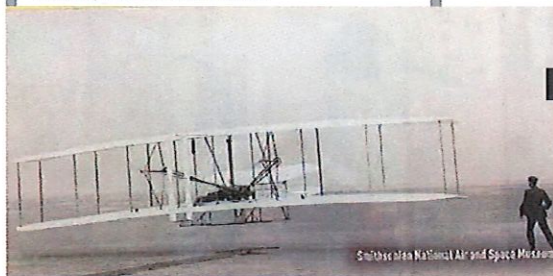


Otto Lilienthal (1848-1896) was the first human to make repeated, successful gliding flights. Starting in _____, Lilienthal made over 2,000 flights in gliders he designed, totaling approximately five hours of flying time.



On _____, a small group gathered near Luckenbach, Texas to witness the purported flight of Jacob Brodbeck (1821-1910), an inventor who had designed and built an airship. Texas lore recounts Brodbeck's 100-foot flight, 12 feet off the ground. In his heavier-than-air vehicle and also notes that an abrupt landing ended his time aloft and destroyed the aircraft.

On _____, with Orville at the controls, the Wrights' heavier than-air plane took flight from the dunes of Kitty Hawk, North Carolina.



Texans, like many Americans in the _____'s gathered at airfields to be entertained by stunt flyers and daredevil aerialists, known as barnstormers, who risked their lives in the sky.

The excitement and financial gain that barnstorming presented drew all types of people to the field of aviation. Bessie Coleman (_____ - _____), an African American and Native American woman from Waxahachie, Texas, was one of these people.



The United States officially entered World War I on _____, and the Army Signal Corps mobilized quickly. By the middle of _____, the Signal Corps had begun construction on 28 new training fields for aviators and support personnel, nine of which were built in Texas.



Having returned to pasture land after World War I, Ellington Field came back to life in _____.



While Germany's attack on Poland in _____ marked the official start of World War II, Japan and China had been fighting each other since the early 1930's. The Japanese attack on Pearl Harbor on _____ plunged the United States into World War II, but as early as _____ the United States had begun to mobilize in anticipation of entering the war.



Previously denied piloting jobs because of their race, African-American aviators were called into military service during the war. Early African-American airmen were self taught or trained overseas, but when the Tuskegee program was initiated in _____, it was the first time the U.S. military accepted minorities for flight training.

WASHINGTON DC ATRWP 4747 PD THESE ARE YOUR OFFICIAL INSTRUCTIONS TO REPT TO COMMANDING OFFICER 316TH AAFSTD AVENGER SIELD SWEETWATER TEXAS ON _____ OF _____ AT YOUR OWN EXPENSE ADMISSION TO WOMEN FLYING TRAINING BRING THIS WIRE PILOT CERTIFICATE AND LOGBOOK STOP

On _____ the Japanese signed surrender documents that ended the war. This followed on the heels of the European Axis' collapse in _____ of the same year.



The Army Air Force acted largely independent of the U.S. Army in World War II and during the war had pursued an autonomous status. It was granted independence when the National Security Act of _____ was enacted on _____



Operation Buster-Jangle, conducted in Nevada in late _____, tested U.S. nuclear weapons capabilities and readiness.



"... I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth."
President John F. Kennedy



On _____, North Korea backed by China and the Soviet Union, invaded South Korea, which was supported by the United States and its allies under the United Nations. During the war, six Air National Guard (ANG) units, including two squadron from Texas were mobilized by the federal government and flew combat missions from _____ to _____

On _____ Apollo 11 lifted off on the mission that would fulfill Kennedy's goal of landing humans on the Moon. The Manned Spacecraft Center (renamed Johnson Space Center in _____) was responsible for training the astronauts controlling the flight.



In the Texas Aviation Hall of Fame, find an interesting person in each of the four section. How does each person's accomplishments fit into the timeline? What significant event happened in that person lifetime?

The Air Force saw its beginnings with Lt. Benjamin Foulois and a single Wright Military Flyer at Fort Sam Houston in _____ and it still maintains major facilities in Texas.

In _____, the U.S. Army's Fort Sam Houston the U.S. Air Force's Randolph AFB and Lackland AFB all merged to form Joint San Antonio under the jurisdiction of the Air Force.



ELEMENTARY SCHOOL FIELD TRIPS

What is a field trip like to the Lone Star Flight Museum?

A visit to the Flight Museum is full of inspiration. Students are greeted by staff and volunteers that will introduce the museum, describe what to look for in the aircraft, and show a video that explains the basics of flight and the evolution of aircraft. As they tour, students will discover the similarities and differences in the planes that allow them to do their specific job. Volunteer School Guides host student visitors, answer questions, and point out fun facts to keep students engaged and inspired. Students will also explore the Flight Academy, our hands-on science and engineering area. A short presentation called *Dreamers*, a look at all the failure in early aviation that led to success, can be added to your schedule. Our staff and volunteers want to work with educators to give students a full and inspiring day.

TEKS CONTENT

In our exhibit areas, the Heritage Gallery explores history of aviation and the Flight Academy is a hands-on demonstration of scientific topics.

SS.5.5A 20 & 21 Centuries

SCI.5.22 Science, Technology, & Society

SS.5.24A Mapping

ENG.4.1 Language Skills

MTH.4.9A Data Analysis

SCI.4.6D Forces

SS.4.5A History WWII

SCI.4.20A Science, Technology, & Society

ENG.3.1.A Listening, Asking Questions

MTH.3.8A Data Analysis

BIG PLANES, BIG DREAMS

Big planes, big dreams, big fun.

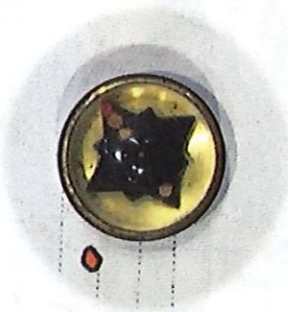
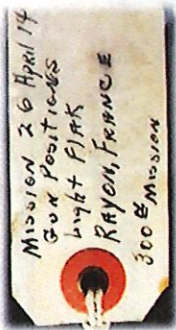
When children have only seen aircraft far way in the sky, seeing them up close is thrilling. Just the size alone of the aircraft is inspiring. The history of aviation is full of people that dreamed of flight- Leonardo da Vinci's ornithopter, the Montgolfier brother's hot air balloon, and the Wright brother's powered flyer, began as ideas and changed the world. The inspiration of aviation is contagious, and a visit to the flight museum can spark a new creativity in a young mind.

What's recommended for Elementary Students?

Spending time in the Flight Academy allows students to experience the science of flight with hands-on displays. This area allows students to explore concepts such as Bernoulli's Principle, Newton's Laws, weather phenomenon, and aviation engineering principles. Touring the Heritage Gallery gives context to the timeline of flight in Texas. Students tour the aircraft hangars to see our collection of about 25 aircraft including many from World War II. A picture hunt keeps students moving and interested throughout and other Activity Guides are available online. Staff can add the presentation *Dreamers* to give an entertaining look at the failures in aviation as we learned the science and engineering required to succeed.

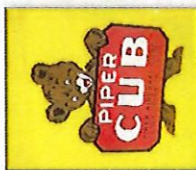
James Talmage
VP of Education, LSFM

In this exhibit, find these items or people in the photographs and posters.



LONE STAR
 FLIGHT MUSEUM
 HOUSTON, TEXAS

Identify the aircraft with these designs



Texas AVIATION HERITAGE

Start here. Follow the pictures in order to fill in the blanks.



HELLO

My Name is _____

Pleasure to meet you

FOR ACTION



Enlist in the _____

Early aviation was a _____

task!

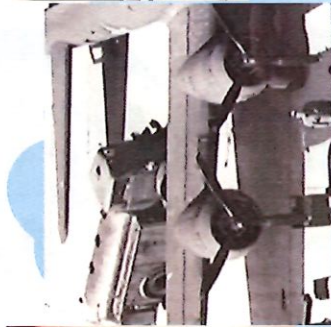


Gibbs AAF, ????

TX



I'm on a _____



The NAA factory built the AT-6 _____

and the P-51 _____

Early training took place in a pool at _____

Air Force Base.

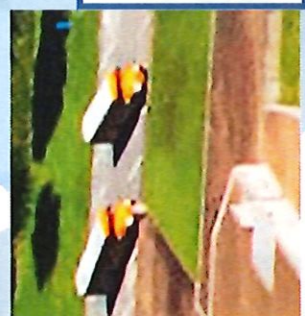


W _____
A _____
S _____
P _____



T _____

A _____

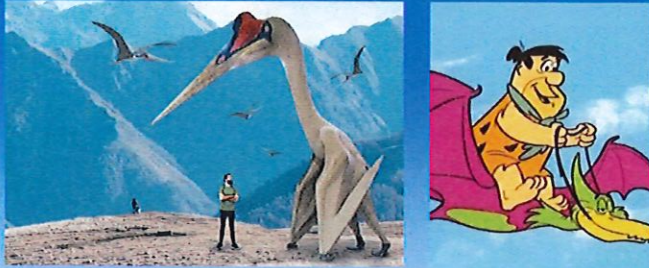


The future of aviation is _____

in Texas!

Dreamers

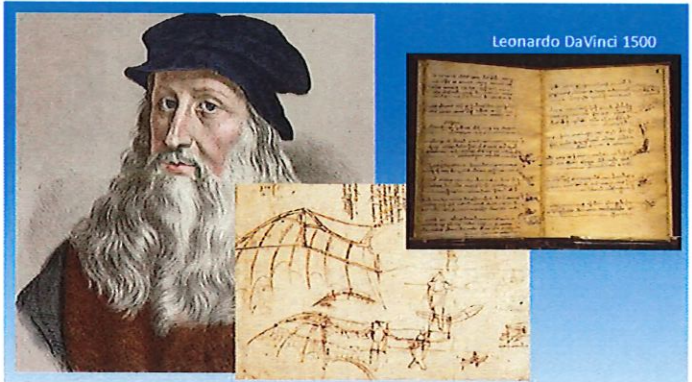
Dreamers is a short presentation about the hundreds of years of failure and key successes that led to humankind taking to the air in powered flight. It gives an entertaining look at the mistakes and bad ideas as humans invented ways to not fly, but never gave up on the dream as each failure taught the next generation how to succeed.



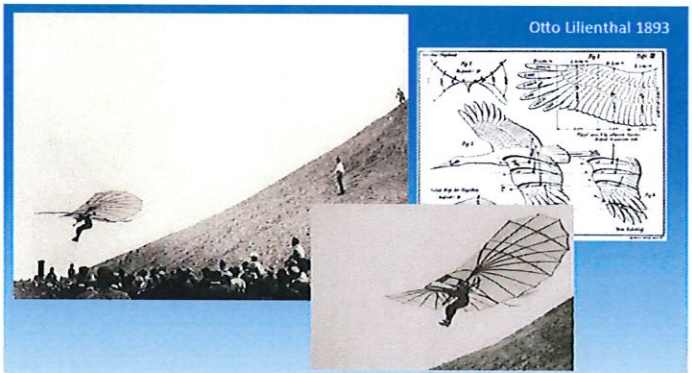
Some prehistoric pterodactyls were large enough for humans to ride, but the timing was off by millions of years.



The hot air balloon was invented in 1783. A rooster, duck, and sheep were the first take to the air, but it seems the birds were cheating.



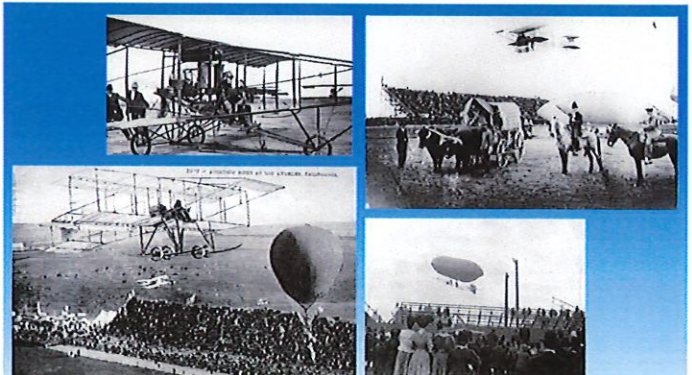
Leonardo Da Vinci observed birds and designed flying machines 500 years ago.



After over 100 years of failure, the next step was Otto Lillenthal's glider, which was very similar to Da Vinci's design.



In the attempt to attain powered flight, many flying machines bordered on the ridiculous. Finally, the Wright Brothers got it right by using the ideas of those before them including Lillenthal.



Within a few years of the first flight, flying machines filled the air. The dream had become reality.



LONE STAR
FLIGHT MUSEUM
≡ **HOUSTON, TEXAS** ≡

What is a field trip like at the Lone Star Flight Museum?

A visit to the museum can be customized for multiple ages in the same group. Students age 10 and up can do an Aviation Learning Center Full Experience, while the Pilot Experience for 8-9 year olds teaches how to prepare for a flight and fly in the simulators. Activity Guide lessons are available to practice math, graphing, and writing in the hangars. Classes are available for hands-on science or a deep dive into historic events. Also for groups, short presentations—*Dreamers*, a look at all the failure in early aviation that led to success, *Doers*, exploring the multitude of jobs in the industry, and *History Makers*, a summary of the leaders and innovators in aviation. All groups are greeted with an introduction to the museum to give context to the aircraft. Volunteer School Guides are available in the hangars and exhibits to answer questions and help students explore.

What's recommended for Home School students?

I encourage Homeschool parents to discuss your learning goals with museum staff. We can make modifications to most activities, customize a schedule, and work with different age groups at the same time. Minimum group size for classes and the ALC is 10 students, but there is no minimum school group size to tour the planes, allowing families to visit and take advantage of educational material. Because aviation encompasses such a large variety of topics, families may consider visiting more than once to focus on a single subject each time.

James Talmage
VP of Education, LSFM

HOME SCHOOL FIELD TRIPS

JUST THE START

The Flight Museum can be just the starting point to inspiring further learning. All aircraft follow the same rules of physics- experiment with model planes to discover the rules of flight. Learning about the Renaissance period? Leonardo DaVinci sketched the first flying machines. Geography? The development of better aircraft connected countries around the world. Investigate how the culture of the US changed when a large percentage of working men went off to war. STEM topics to be studied are almost limitless. Seeing these Warbirds up close is inspirational. Let your curiosity push you to explore more.

Scan the code with a
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learn more about the ALC.



CLASSES

Classes are available for a hands-on approach to the science of aviation or an investigation into historical events. Topics include rubber band power, aerodynamics, The beginning of WWII and the Doolittle Raid, and Zero-G.



For Homeschool specific
information, go to
lonestarfliight.org. Click Learn,
Fieldtrips, look for
"Homeschoolers".

