

Social Studies In Flight



Celebrating the Centennial of Powered Flight



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Dear Educator

The United States Air Force is proud to present you with the Centennial of Flight themed Educational package "Education in Flight". These supplements are designed to provide you with a re-usable set of lesson plans, test, quizzes and posters that will help to enhance your curriculum. The Centennial of Flight year has been dedicated to celebrating the accomplishment of Wilbur and Orville Wright culminating on the official anniversary of their achievement in Kitty Hawk, N.C. on December 17th 2003. We hope that these themed plans can be incorporated in your lessons for this fall and used to encourage children to explore the many opportunities aviation has to offer.

Sincerely

A handwritten signature in black ink, appearing to read "J. J. Shepherd", is written over the typed name and title.

JAMES J. SHEPHERD
Lieutenant Colonel, USAF

Director, Air Force Centennial of Flight Office

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This text is designed for reading aloud, discussion, presentation on overhead projectors, and/or photocopying for distribution to students. An answer key for all of the questions that are used in assignments/assessments is included at the end of this text.



Introduction

On December 17, 1903, near Kitty Hawk, North Carolina, the Wright Brothers made history. For thousands of years before Orville Wright piloted the *Wright Flyer I* over Kitty Hawk, man had an interest in trying to copy the birds. Daedalus & Icarus in Greek mythology are said to have tried to reach the sun. Through many studies, it was realized that due to our muscle structure and the heaviness of the human body, man would need a lot of help to fly. Thus began the study of birds, the shape of their wings, and the intricacies of their ability to fly.

Class discussion

1. Prior to powered flight, how else did man try to see the world from the sky?
2. How has air travel directly affected the History of the United States?
3. List the 10 most important inventions of our time. Give reasons to support your answers.



Homework

Use the internet or an encyclopedia to find and draw a map that includes Kitty Hawk, North Carolina; Millville, Indiana; and Dayton, Ohio. What is the significance of the three cities? Calculate the distance between Kitty Hawk and Dayton. Kitty Hawk is the place most of us think of when we think about the first powered flight by the Wright Brothers. Where exactly did the flight begin, and why did the brothers choose this location?



Word Search

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

Find and circle each of these keywords in the word search.

Words may be forward, backward or diagonally hidden.

Armstrong
 Barnstormer
 Borman
 Coleman
 Concorde
 Curtiss
 Earhart
 Flyer
 Gagarin
 Katharine

Kitty Hawk
 Lindbergh
 Lockheed
 Lucid
 Mitchell
 Orville
 Sikorsky
 Wilbur
 Yeager
 Zeppelin



Wright Brothers Timeline Handout

Ohio
Dayton

1867 — Wilbur Wright born.

1870 — Alphonse Penaud of France uses twisted rubber bands to power a miniature helicopter. It is copied by dozens of toymakers in Europe and America.

1871 — Orville Wright born; Francis Herbert Wenham and John Browning of England, invent the wind tunnel.

1878 — Bishop Milton Wright, father of Wilbur and Orville, brings home a rubber band-powered Penaud-type helicopter for his sons. They build several copies. Orville tells his teacher that he and Wilbur plan to build a large enough machine to carry them both. When they try to build a larger model, it doesn't fly.

1880 -

1890 — Otto Lilienthal of Germany begins to test wing surfaces and measure lifting capacity.

1892 — Wilbur and Orville purchase “safety bicycles” and open sales and repair shop.

1896 — Wright brothers begin to manufacture their own bicycles.

1898 — Wilbur observes that buzzards control their lateral balance by twisting the feathers at the tips of their wings.

Wright Brothers Nat'l Memorial
North Carolina

1899 — Orville & Wilbur invent system of wing warping and use it to fly a kite. Wilbur writes the US Weather Bureau and inquires about locations with high winds, and learns of Kitty Hawk.

1900 — Wrights fly Glider No. 1 at Kitty Hawk, NC.

1901 — Wrights fly Glider No. 2 at Kill Devil Hills. Wrights build a wind tunnel to conduct their own research on wing surfaces.

1902 — Wrights make almost 1,000 flights on Glider No. 3, invent coordinated warp and rudder control.

1903 — Wrights achieve powered, sustained, controlled flight from level ground in *Flyer I* at Kill Devil Hills.



Wright Brothers Timeline Notes

Wilbur and Orville Wright were the sons of Milton and Susan Wright, married in 1859. Mr. and Mrs. Wright had a total of 7 children; 2 of them (twins) died in infancy. Milton Wright was a bishop in the United Brethren Church, and traveled frequently because of his job. In 1884, after moving his family 12 times, Bishop Wright decided to return his family to Dayton, OH, the political capital of the United Brethren Church. This was the family's final move.

Throughout their childhood, it is reported that Wilbur and Orville liked to experiment. When their father returned home one evening in 1878 with a toy helicopter made of cork and bamboo with paper wings and powered by rubber bands, the boys were intrigued. It is said that they wound it up repeatedly so that they could watch it fly, and soon they began to build and test numerous copies. Fortunate for the brothers, they lived in a home where activities that nurtured curiosity and experimentation were encouraged. During the Bishop's absences, Susan Wright managed the household, including repairing household appliances, as well as designing toys, utensils, and clothes. Their older brother Lorin made improvements for a hay-baling machine, and Wilbur and Orville did their share of "tinkering" and experimenting. Eventually the brothers, who had been close throughout childhood, would get into the printing business (Orville published 8th grade newspaper for his school for a while, as well as other local printing). Collaboratively they designed a printing press and for a while, ran a weekly neighborhood paper. They later got into the bicycle business, and were building their own bicycles by 1896. Interestingly enough, neither brother went to college. Just after high school, Wilbur opted to take care of his mother, who had gotten tuberculosis. Orville dropped out of high school and opened his own print shop in 1889, the year his mother died.

With the bicycle business and their early attempts with the toy helicopter, the brothers had the beginnings of aeronautic experimentation, but did not put the two together until 1896. James Means, a Boston editor for the *Aeronautical Annual* had made the con-



Photo of a Wright brothers' bicycle, 1897.

nection, and wrote, "To learn to wheel one must learn to balance. To learn to fly one must learn to balance. Why not begin now?" (Moolman, Valerie & the editors of Time-Life Books; *The Road to Kitty Hawk*). The 1896 newspapers contained many articles about flying machines thus sparking new interest in the Wright brothers. Otto Lilienthal had already conducted research and designed and tested 18 manned gliders and in 1891 he had made his first glider flight. By the time of his death in a glider crash in August 1896, Otto had already made over 2,000 glider flights. It was after Otto Lilienthal's death that the Wright brothers decided to conduct more research in aviation. Besides Lilienthal's research, the Wrights also read about work by Sir George Cayley and Alphonse Penaud among others. By 1899 they had also read several editions of James Means' *Aeronautical Annual* and *Progress in*



Start of a glide; Wilbur in motion at left holding one end of glider (rebuilt with single vertical rudder), Orville lying prone in machine, and Dan Tate at right; Kitty Hawk, North Carolina

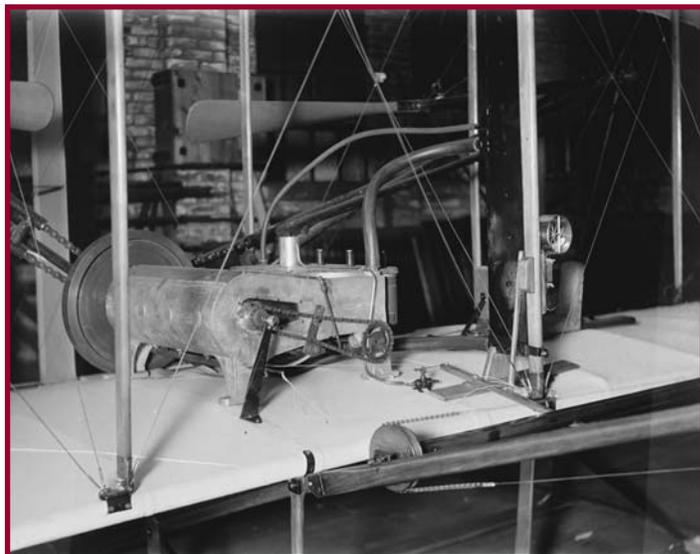


Wright Brothers Timeline

Flying Machines by American Octave Chanute. Wilbur would later begin correspondence with Octave Chanute about the progress of their gliders.

Because of the strong Atlantic winds, and the sand making an ideal cushion, the brothers made many test flights in Kitty Hawk, North Carolina. After several failures, the Wrights built a wind tunnel so that they could conduct experiments to determine the best wing shape for an airplane. The third glider, constructed by the Wright brothers by the end of 1902, was their first successful flying machine. And so the race was on. The Wright brothers, like several others both here and abroad, had the same goal of trying to build a machine capable of powered, controlled flight. Among them were Dr. Samuel Langley of the United States with his assistant Charles Manly, and in Europe Ferdinand Ferber of France.

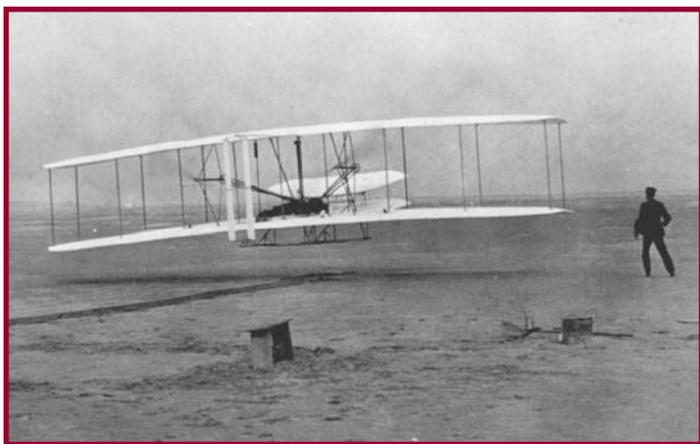
Assisted by their mechanic Charlie Taylor, the Wrights worked on building a gasoline engine that would be light but powerful enough to propel an airplane. At the same time, they also worked on designing propellers. The Wrights left Dayton and returned to Kitty Hawk in September 1903. In their many visits to Kitty Hawk they had gotten to know a few of the locals including the Tate family. Dan Tate became one of their assistants at the site in Kill Devil Hills. Between September and December of 1903 the Wrights met with several trials including bad weather. On Monday, December 14, 1903 after winning a coin



Rear view of the Wright brothers' 1903 motor in the shop, January 1, 1928, before its shipment to the Science Museum in London on January 31, 1928

toss, Wilbur Wright had the honor of piloting what the Wrights believed would be the first powered flight. The airplane covered 105 feet in $3\frac{1}{2}$ seconds but the Wrights did not consider it a complete success. After a few repairs to the *Flyer* the brothers were ready for another attempt on December 16th but the wind died before they could get the machine in position for takeoff. Thursday, December 17, 1903 was a very cold winter morning. As a result of the coin toss of a few days earlier, at 10:35 a.m. Orville Wright piloted the first heavier-than-air craft that had left the ground by its own power. After 12 seconds and 120 feet, landed at a point as high as the one from which it had started. The Wrights made three other flights that day.

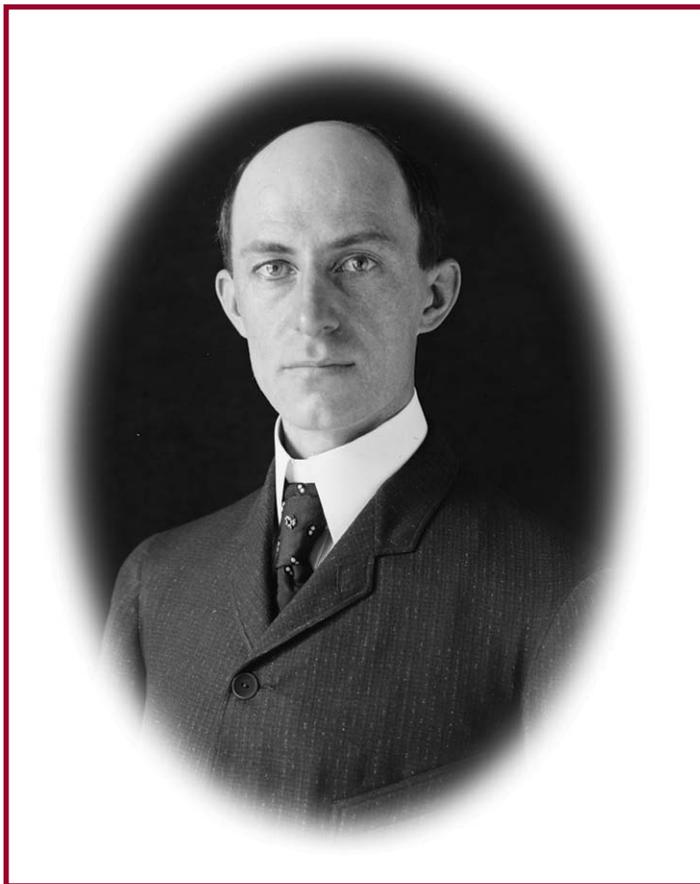
The brothers returned to Dayton and worked on perfecting their invention. Their 1905 *Flyer 3* was probably the world's first practical airplane. The Wright brothers, sometimes accompanied by their sister Katharine, met with audiences both here and in Europe. In 1909 the brothers had issued licenses for companies in Britain, France, and Germany to build their aircraft. In the same year, they also founded the American Wright Company, which later became the Wright Aeronautical Corporation. In 1910 they started



First flight, 120 feet in 12 seconds, 10:35 a.m.; Kitty Hawk, North Carolina



Wright Brothers Timeline

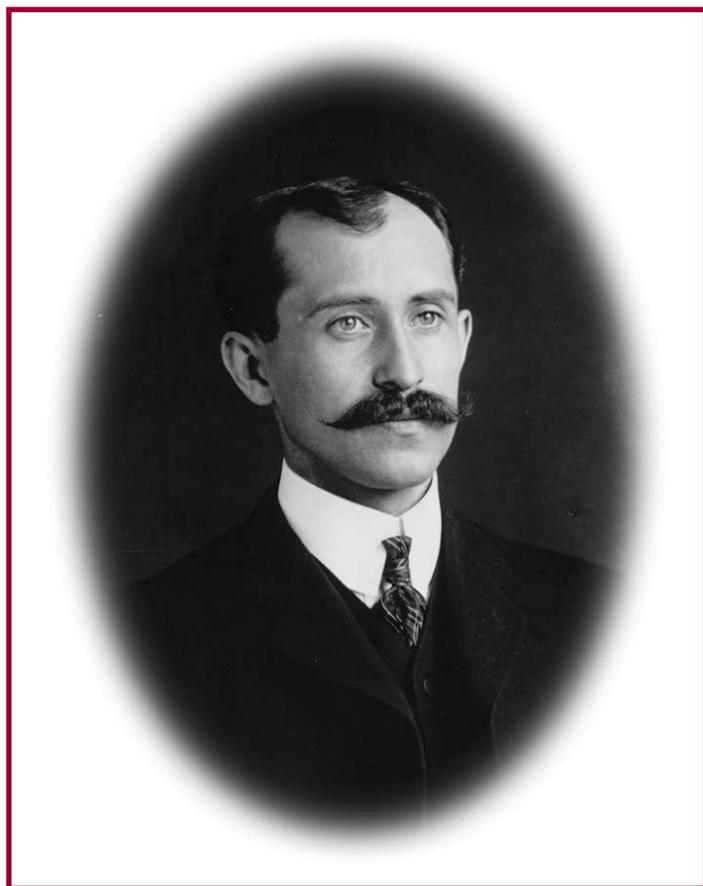


Wilbur Wright, age 38, about 1905; one of the earliest published photographs of him.

a flying school in Montgomery, Alabama. By this time, there were other successful aircraft manufacturers throughout the world including Louis Bleriot of France, Alliot Verdon Roe of England, and Glenn Curtiss of the United States.

Wilbur Wright died of typhoid fever in 1912 at the age of 45. After Wilbur's death, Orville took over

presidency of the Wright Company and sold his interest in the company in 1915. Orville continued to do research, and also served on several aeronautical boards. His most successful invention after the death of his brother was the split flap, designated to slow the speed of an airplane during a steep dive. It was used on dive-bombers in World War II. Orville pretty much kept a low profile in his later years. He died after a heart attack in 1948 at the age of 77.



Orville Wright, age 34, with mustache about 1905.

Class group assignment

In groups of 3 or 4, prepare a news broadcast or documentary to present during the final lesson. Each group will have a different time period in the life of the Wright brothers. Include eyewitness reports, a possible interview with one of the Wright brothers, in studio commentary, and a weather report complete with map. Use the information given, the internet, and any other materials available.



Quiz 1

Name: _____

Date: _____

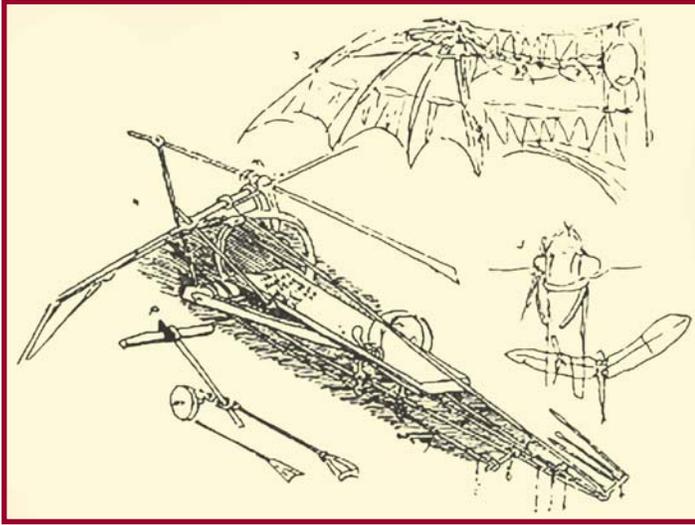
- 1. Discuss the reason(s) the Wright family moved so frequently between 1859 and 1884.

- 2. With what other 2 “businesses” did the brothers experiment prior to specializing in airplanes?
(1 point for each answer)

- 3. How did the Wright brothers choose Kitty Hawk as their test flight location?



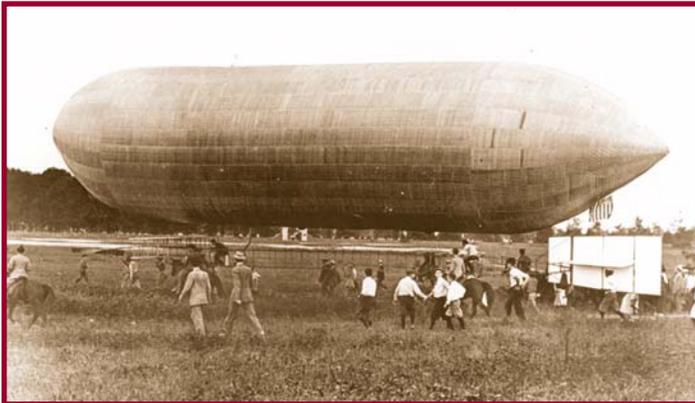
History of Flight Handout



15th century ornithopter (flapping wing machine) designed by Leonardo da Vinci.



Low-angle view of a Douglas DC 3 airliner 'City of Portland,' with its propellers spinning in preparation for take off from an airport runway. These aircraft were a mainstay of early commercial aviation in the postwar era.



In the 1700s hot air balloons became popular and in 1900, Count Ferdinand von Zeppelin built his first airship.



One of the most famous planes from the WWII era, the North American P-51 Mustang.



The Curtiss JN-4 "Jenny" was used as a trainer in WWI. Glenn Curtiss had the first contract to build US Navy airplanes.



Bombers became popular in the 1918. The above photo shows a Boeing bomber in flight in 1932.



History of Flight Handout



Enola Gay, a Boeing B-29 Superfortress bomber dropped a 9,700 pound uranium bomb on Hiroshima, Japan.



During Operation Desert Shield, Operation Desert Storm and the Gulf War the U.S. Air Force made use of the Lockheed F-117 Nighthawk which is painted flat black to absorb both light and radar.



The shuttle program has deployed many government and commercial satellites and has facilitated research aboard the Space Stations.



The SR-71 Blackbird is specifically designed to survive over hostile territory. It flies over 15 miles high, at a cruise speed over three times the speed of sound. Although built during the 1960s, the airplane is not old in any sense. Its structure is stronger now than when built, due to reannealing during high-speed flight.

Additional Notes



History of Flight Notes

The earliest attempts at flight involved the use of wings made of feathers, and many casualties resulting from jumps off towers and high buildings. Daedalus and his son Icarus in Greek mythology were said to have used feather and wax wings in an attempt to escape from Crete. Icarus is said to have flown too close to the sun, thus melting the wax on his wings. In the 15th century, Leonardo da Vinci designed, but never built ornithopters (flapping wing machines). Others built and tried to use ornithopters, but were not successful. Hot air balloons became popular in the 1700s, and in 1783, the Montgolfier brothers of France were carried through the air in a balloon made of paper and cloth. The Chinese were probably the pioneers of flight with their kites. Sir George Cayley, a British engineer, used the kite as his inspiration to design one of the first gliders. German, Otto Lilienthal also used the kite to develop wings for his glider. Later came steam powered aircraft. Steam engines were too heavy, and not powerful enough to enable sustained flight. The invention of compact, light, gas engines made powered, sustained flight a reality. In 1852, Henri Giffard, a French engineer, built the first airship. Count Ferdinand von Zeppelin built the first rigid airship in 1900. Between 1910 and 1913, more

The Wright's strongest competitor was Glenn Curtiss. By 1909 when the Wrights were past their heyday, Glenn Curtiss was at the forefront of the industry. Curtiss planes differed from the Wright planes in that he had expanded on their wing warping system with the use of ailerons (moveable surfaces placed at the edges of the wings to control the craft in the roll axis). Ailerons allowed the use of more rigid wings. Curtiss planes also used wheeled landing gear rather than skids. Glenn Curtiss had the first contract to build US Navy's airplanes. He designed and developed the JN-4 "Jenny" which was widely used as a trainer in World War I. He was the first builder of seaplanes in the United States. Seaplanes became popular in the 1930s.



The Curtiss JN-4 "Jenny" was used as a trainer in WWI. Glenn Curtiss had the first contract to build US Navy airplanes.



In the 1700s hot air balloons became popular and in 1900, Count Ferdinand von Zeppelin built his first airship.

than 30,000 people traveled in Zeppelin airships on sightseeing trips over Germany. The *Graf Zeppelin* was probably the most successful airship, while the *Hindenburg* was the most famous, after exploding in 1937 in Lakehurst, New Jersey. Sixty-two of the ninety-seven passengers managed to escape. Both airships carried passengers across the Atlantic.

Helicopters and passenger aircraft are now quite popular. Leonardo da Vinci, who lived between 1452 and 1519, made drawings of a lifting airscrew (also called a helix). Sir George Cayley and Thomas Edison also explored and experimented with rotors and lift. In 1907 Paul Cornu became the first person to fly in a helicopter when his aircraft rose up to five feet off the ground for twenty seconds. Russian born Igor Sikorsky immigrated to the United States after the Russian Revolution. In 1939 he designed America's first successful helicopter. Helicopters became widely used in the military and later in commercial transportation.

The first official airline in the United States began transporting passengers between St. Petersburg and Tampa, Florida in 1914. However, it was an airboat with room for only one passenger at a time. After Armistice (the end of WWI) air transport began to



History of Flight Notes

prosper. The U.S. Post Office began its airmail service in 1918 with service between New York and Washington, and then coast to coast in 1920. In 1919 with the use of surplus warplanes, airline services began in Germany, France and Britain. By the 1920s most European countries had at least one airline. Aeromarine West Indies Airways flew between Key West, Florida, and Havana, Cuba and became the first international passenger service in the U.S. in the 1920s. In the 1930s the U.S. Post Office and small American companies merged to form the four major airlines: United, TWA, American and Eastern. Trimotor airplanes manufactured by companies including Fokker, Boeing and Ford were used by several airlines. The propeller-driven Douglas DC-3 made in 1936 is the most successful propeller-driven airliner as it made passenger airlines profitable. The first jet airliner was the English de Havilland Comet in 1952, and the Boeing 747 in 1969 was the first wide-bodied jumbo-jet airliner. The Concorde program was started by the British and French governments in 1962 with the goal of developing a passenger airplane that could fly at the speed of sound. The dream was realized in 1969. After modifications, British Airways and Air France began transporting passengers commercially in 1976. Companies including Beechcraft and Cessna made small, light airplanes, which made it possible for many people to learn to fly for recreation as well as for various business purposes.

The military began using aircraft in combat in World War I. Because they could not fly very far or fast (not more than 200 miles, with speeds 60 to 70 miles per hour) and they were unarmed, airplanes were first used for reconnaissance. Later, pilots began carrying handguns to fire at other planes, then airplanes were fitted with machine guns. In 1915 French pilot Roland Garros with the help of French aircraft designer Raymond Saulnier attached steel plates to the backs of the propeller blades to protect them from forward-firing machine guns. German aircraft designer Anthony Fokker, who with Heinrich Luebbe developed a system that synchronized the propeller with the gun, improved this method. The German Air Force was at an advantage with the use of the Fokker Eindecker.

The Allies responded with faster, more maneuverable aircraft such as the D.H. 2 made by British designer Geoffrey de Havilland and France's Nieuport 11. Bombers became increasingly popular by 1918.

After World War I there was a surplus of planes and a shortage of jobs for former fighter pilots. As a result, "Barnstorming" became popular in the 1920s. A barnstormer was an independent stunt flyer who traveled from place to place performing in air shows. Stunts included wing walking, loop-the-loops, barrel rolls and plane to plane transfers in mid air. Pilots of both genders participated in barnstorming. Air races were also popular.



One of the most famous planes from the WWII era, the North American P-51 Mustang.

World War II began with dive-bombers in 1939 which was also the year that began the turning point for the aviation industry. Between 1939 and 1945 there were more airplanes manufactured and more pilots trained than any other time in history. Airplane designers and manufacturers from European countries as well as the United States contributed to the WWII efforts. The most famous planes at the time were the British Supermarine Spitfire, the German Me 109 designed by Willy Messerschmitt, the North American P-51 Mustang, the Boeing B-17 Flying Fortress bomber which could carry up to 17,600 pounds of bombs, and the Grumman F6F Hellcat which was the plane most frequently flown from aircraft carriers in 1943. The Boeing B-29 Superfortress bombers first entered the war in June 1944 and the most famous of them is the *Enola Gay* which dropped the 9,700 pound uranium bomb on Hiroshima, Japan. The war ended shortly after the B-29 bomber *Bock's Car* dropped the second



History of Flight Notes

atomic bomb on Nagasaki. Jet fighters were introduced towards the end of WWII.

Jet fighters, rocket-powered planes and supersonic bombers were used in the Cold War, Korean War and the Vietnam War. The first all jet battle took place during the Korean War. Although built during the



The SR-71 Blackbird is specifically designed to survive over hostile territory. It flies over 15 miles high, at a cruise speed over three times the speed of sound.

1960s, the SR-71 Blackbird is not old in any sense. It flies over 15 miles high, at a cruise speed over three times the speed of sound and its structure is stronger now than when built, due to reannealing during high-speed flight. During Operation Desert Shield, Operation Desert Storm and the Gulf War the U.S. Air Force made use of the Lockheed F-117 Nighthawk which is painted flat black to absorb both light and radar. The Northrop B-2 Spirit or “stealth bomber” was unveiled in 1988, the first flight of a B-2 took place in 1989, and the first operational B-2 was delivered in December 1993.

Spaceflight became a reality in the 1960s. German-born engineer Wernher von Braun helped to develop missiles that were used against Great Britain in WWII. After the fall of the Third Reich, along with other German engineers, he was offered a contract to continue research in the United States. He helped to build America’s postwar missile program and developed the Redstone battlefield rocket. A modified Redstone put the first U.S. satellite into orbit in 1958. Von Braun continued to develop rockets that later sent astronauts to the moon. The Space Shuttle program was authorized in 1972 and on April 12, 1981 history was made when *Columbia*, the first reusable spacecraft was launched. *Columbia* landed like an airplane two days later. The shuttle program has deployed many government and commercial satellites and has facilitated research aboard the Space Stations.

Class group assignment

Materials: Four sheets 8½” x 11” paper
Three 3” x 5” index cards
One roll masking tape
One box of paper clips

Task: Using materials provided, work together to design your own “flying machine”. The Wright brothers had to work as a team to achieve what they did. The emphasis of this activity is more on teamwork and problem solving than it is on the accuracy of the flying machine. You will be given 10 minutes. Your team should be able to explain to the group the reason for your design.



Famous Men and Women Handout



Katharine Wright, wearing a leather jacket, cap, and goggles, aboard the Wright Model HS airplane with Orville, 1915.



John Alcock (1892 - 1919) and Arthur Brown (1886 - 1948) in the cockpit. John Alcock met his death in December 1919, 30 miles from Rouen, after colliding with a tree.



American aviatrix Harriet Quimby (1875 - 1912), the first American woman to gain a pilot's license.



American aviator and inventor Glenn Hammond Curtiss (1878 - 1930), inspecting a flying boat glider, which he is to try out within two weeks at great South Bay, Long Island.



Louis Bleriot (1872 - 1936), French airman who made the first flight across the English Channel in 1909.

Additional Notes



Famous Men and Women Handout



© New York Times Co./Getty Images

American aviator Amelia Earhart (1898 - 1937) climbs into the cockpit of her airplane at Willow Grove, Pennsylvania, just before embarking on a trip to California.



© Hulton/Archive by Getty Images

American pilot and aviation pioneer Billy Mitchell (1879 - 1936), who commanded the American airforce during World War I.



Some of the 992 pilots of the first black American pilot training program in WWII who were known as the Tuskegee Airmen.



Orville Wright, Major John F. Curry, and Colonel Charles Lindbergh, who came to pay Orville a personal call at Wright Field, Dayton, Ohio, June 22, 1927

Additional Notes

Shannon Lucid holds the American record for the most time spent in space while on the Russian space station Mir.



Famous Men and Women Notes

Although Wilbur and Orville are the famous Wrights, their sister Katharine was said to have been closer to Orville than Wilbur was. She was very instrumental in her brother's achievements and became one of the first women to ride in a powered aircraft.



Katharine Wright, wearing a leather jacket, cap, and goggles, aboard the Wright Model HS airplane with Orville, 1915.

Mrs. Hart Berg was the first American woman to ride in an airplane as a passenger of Wilbur Wright. Blanche Stuart Scott became the first American woman to pilot a plane. She was not allowed to fly solo as she was still taking lessons, but took control of the throttle during practice one day in 1910 and made a short, unofficial flight. Also in 1910, Baroness Elise de Laroche from France became the first female pilot and successfully flew in several air races. In 1919 she became the first woman to die in an air accident. Harriet Quimby was the first American woman licensed to fly, and in 1912 she became the first woman to fly across the English Channel. Katherine Stinson was the fourth woman in the United States to obtain a pilot's license. In July 1912 and in July 1915 she was the first woman to loop-the-loop. She delivered mail and was the first female commissioned airmail pilot.

Between 1909 and 1919 there were a lot of firsts in aviation history. People not only wanted to fly but there was also the challenge of sustained flight across country, and across nations. In 1909, Louis Bleriot, a Frenchman, flew from France to England across the

English Channel. Cal Rodgers successfully flew across the United States in 1911 (after five crashes!) and John Alcock and Arthur Brown made the first nonstop flight across the Atlantic in 1919. In 1909 Glenn Curtiss won the world's first air race flying an open biplane at forty-seven miles per hour.

Eugene Bullard was the first black fighter pilot who joined the French Foreign legion during World War I. He was also the only black WWI pilot. Bullard was not able to fly for his country because of restrictions in the United States at the time.

In November 1920 Bessie Coleman went to France in order to learn to fly, since she was not allowed to learn to fly in America. Bessie Coleman earned her pilot's license from the Federation Aeronautique Internationale in June 1921 and became the first black American woman, and the second black American to fly.

Amelia Earhart learned to fly in 1921, and broke many records. In 1928, she was the first woman to cross the Atlantic by airplane (as a passenger), and in 1932 she became the first woman to fly solo across the Atlantic. At 2,026 miles it was also the longest nonstop flight by a woman. Amelia also became the first woman to fly nonstop across America. In 1935 she became the first woman pilot to make a solo, long distance flight over the Pacific. Amelia Earhart made it her goal to become the first pilot, male or female, to fly around the world at the equator. In July 1937 she disappeared without a trace in her attempt at reaching her goal.

Charles Lindbergh flew across the Atlantic in the *Spirit of St. Louis* in 1927, and in 1928 Charles Kingsford-Smith and Charles Ulm, both Australian, crossed the Pacific. Anne Morrow Lindbergh married Charles Lindbergh in 1929 and, as his copilot, accompanied her husband on many flights. Together they explored air-line routes around the world and planned the most secure and practical routes for commercial airlines.

In 1933 Wiley Post became the first person to fly solo around the world. In 1934 he designed the



Famous Men and Women Notes



Orville Wright, Major John F. Curry, and Colonel Charles Lindbergh, who came to pay Orville a personal call at Wright Field, Dayton, Ohio, June 22, 1927

world's first pressurized suit. He broke the altitude record by reaching 50,000 ft. in 1934, the same year he discovered the jet streams. The jet streams are high altitude "rivers" of air, which are used by today's pilots to fly faster using less fuel than at lower altitudes.

In the 1930s other solo female long-distance pilots included Amy Johnson of England who flew to Australia, Australian Loes Bonney who flew to South Africa, and New Zealander Jean Batten who crossed the South Atlantic. Ruth Nichols broke many speed and altitude records in the 1930s and founded an ambulance air service called Relief Wings in 1939. She became the first woman to circle the earth in a plane in 1949 while working for UNICEF. Louise Thadden set numerous women's altitude, speed, and endurance records, and won the first women's cross-country air race in 1929. She won the 1936 cross-country air race by flying faster than any male or female pilot.

In 1932 pilot James Banning and mechanic Thomas C. Allen who called themselves the Flying Hobos flew from California to New York. The trip took them a total of three weeks, although they were only in the air for forty-one hours and twenty-seven minutes. They became the first black Americans to fly across the United States.

British woman Beryl Markham became the first woman to fly solo from London, England to North America (from east to west, against strong winds) in 1936. She was born in Britain and moved to Kenya with her parents at the age of 3. She became the first woman in Kenya to receive a commercial pilot's license.

US Air Force officer Chuck Yeager was a World War II fighter pilot and became famous in 1947 for being the first pilot to break the sound barrier. In 1953 he also became the first person to fly at Mach 2, or twice the speed of sound. Also in 1953, American Jacqueline Cochran became the first woman to break the sound barrier and she later became the first woman to fly at twice the speed of sound. Jackie Cochran earned her pilot's license in 1932 and from early on in her career became a vocal advocate of women's equality with men in the air. In 1958 she also lobbied for a corps of women astronauts but died almost three years before the first American woman would fly in space in 1983. By her death in 1980, Jackie Cochran held more speed, altitude, and distance records than any other pilot of either gender. Jackie Cochran is also noted for organizing and directing the Women's Airforce Service Pilots (WASP) trained to fly military aircraft in noncombat missions during World War II.

In 1964 Geraldine Mock became the first woman to fly solo around the world, and in 1986 Dick Rutan and Jeana Yeager made the first and nonstop-unrefueled around-the-world flight. In 1993 Vicki Van Meter became the youngest pilot to fly coast to coast from east to west across the United States and the youngest pilot to set a distance record of 2900 miles. In the summer of 1994, at age thirteen, she piloted a plane from the United States to Europe.

William "Billy" Mitchell was a US Army Air Service aviator in World War I. As a US Army officer he advocated for a separate US Air Force and greater preparedness in military aviation. During WWI he organized the first massive aerial attacks.



Famous Men and Women Notes

Henry Harley Arnold learned to fly from the Wright brothers in 1911. In 1949 he became the first General of the Air Force. “Hap” Arnold helped establish and build the US Army Air Forces into the largest airforce in history during WWII.

In June 1936 Benjamin O. Davis, Jr. became the first black cadet to graduate from West Point. He was in the first military pilot training class for black Americans and became a member of the Tuskegee Airmen of World War II. He was the first black American to earn his wings. Benjamin Davis was also the first black American to become a lieutenant general in the US Air Force. Daniel James, Jr. was also a member of the Tuskegee Airmen. He graduated from the Army Air Corps Cadet Program at the top of his class. He was a



Some of the 992 pilots of the first black American pilot training program in WWII who were known as the Tuskegee Airmen.

fighter pilot in the Korean War and Vietnam. In 1975 he became the first black US four-star general. After spending many hours in the air and breaking many flight records Geraldyn Cobb became the first woman to test for astronaut training in 1960. Frank Borman commanded the first manned flight around the moon in 1968 accompanied by James Lovell and

William Anders. In 1969 Neil Armstrong became the first person to set foot on the moon with Edwin “Buzz” Aldrin while Michael Collins circled the moon in the command module. John Glenn, Jr. became the first United States astronaut to orbit the earth in 1962, and in 1998 at age seventy-



Shannon Lucid, NASA bio portrait

seven he became the first senior citizen in space. Shannon Lucid holds the American record for the most time spent in space on Russian space station Mir. Commander John Young and pilot Robert Crippen were aboard the launch of the first space shuttle *Columbia* in 1981. In 1985 Frederick Gregory became the first black American to pilot a space shuttle, he also became the first black American commander of a space shuttle mission in 1989. Bernard Harris, Jr. was the first black American to walk in space in 1995. On that mission, Bernard Harris and fellow astronaut Michael Foale spacewalked for almost five hours. In 1990 Eileen Collins became the first woman accepted for astronaut training as a pilot. She piloted a space shuttle in 1995 and in 1999 became the first woman commander of a spacecraft.

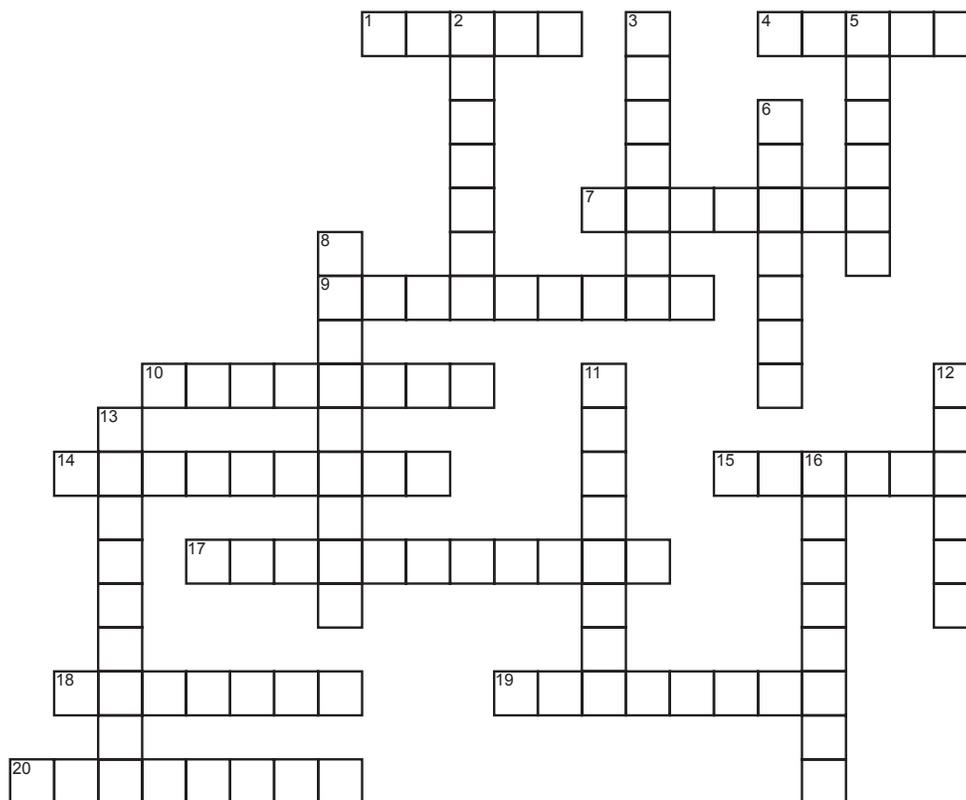
Since 1903 many advances have been made in the aviation and aerospace industries. Both women and men have broken many records, and there continue to be pioneers in the air and in space.

Class Discussion

In teams, debate the pros and cons of women in air and space. There should be sound reasons to support your views.



Crossword



ACROSS

- This woman holds the record for the most flight hours in orbit.
- Name of the Wright brothers' famous plane.
- Wright brother who piloted the famous flight on December 17, 1903.
- The first person to walk on the moon.
- WWI US Army Air Services veteran who advocated for a separate US Air Force.
- First person to fly alone across the Atlantic.
- Older of the two famous Wright brothers.
- Independent stunt flyer who traveled from place to place performing in air shows in the 1920s.
- First woman to fly solo across the Atlantic.
- Program started in 1962 by the governments of Great Britain and France to create supersonic transport.
- Russian who experimented with multiengine planes. In 1939 he made America's first successful helicopter.

DOWN

- Wright brothers' strongest competitor in the early 1900s.
- First man in space.
- First person to travel faster than the speed of sound.
- Woman who was the second black American to fly.
- Very helpful sister of the Wright brothers.
- Inventor of the first rigid airship/dirigible balloon.
- Commander of the first manned mission around the moon.
- Place in North Carolina made famous by the Wright brothers.
- Large aircraft company which has been a worldwide leader in aviation and aerospace technology. Brothers Allan and Malcolm first began building planes in San Francisco in 1961.





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