EXPLORING AERONAUTICS

Part II

Section 3

Social Studies

Note: All references to the "History" subsection in this unit refer to the CD-ROM **Exploring Aeronautics.** To find the "History" subsection:

1. Start the CD-ROM.
2. After the introduction, click on the building with the three flags waving. This is known as The Resource Center.
3. Click on the "History" button at the upper left hand corner of the The Resource Center main page.
4. The first page of the "History" subsection will be displayed.

Connections: This section (Part II, Section 3, Social Studies), which involves working with a historical timeline, coordinates very well with Part II, Section 4, Mathematics. In Section 4 you will find a lesson on the mathematics involved in making a historical timeline. It is called "Timeline Mechanics".

Correlation to the National Social Studies Standards

I. Culture

- explore and describe similarities and differences in the ways groups, societies and cultures address similar human needs and concerns;
- give examples of how experiences may be interpreted differently by people from diverse cultural perspectives and frames of reference;
- describe ways in which language, stories, folktales, music and artistic creations serve as expressions of culture, and influence behavior of people living in a particular culture.

II. Time, Continuity and Change

- demonstrate an understanding that different people might describe the same event or situation in diverse ways, citing reasons for the differences in views;
- read and construct simple timelines; identify examples of change; and recognize examples of cause and effect relationships;
- compare and contrast different stories or accounts about past events, people, places, or situations, identifying how they contribute to our understanding of the past;
- identify and use various sources for reconstructing the past, such as documents, letters, maps, textbooks, photos and others;
- demonstrate an understanding that people in different times and places view the world differently;
- use knowledge of facts and concepts drawn from history, along with elements of historical inquiry, to inform decision-making about and action-taking on public issues.

III. People, Places and Environments

- use appropriate resources, data sources, and geographic tools such as atlases, data bases, grid systems, charts, graphs, and maps to generate, manipulate and interpret information.

IV. Individual Development and Identity

- identify and describe ways family, groups, and community influence an individual's daily life and personal choices;

- explore factors that contribute to one's personal identity such as interests, capabilities and perceptions;
- analyze a particular event to identify reasons individuals might respond to it in different ways;
- work independently and cooperatively to accomplish goals.

V. Individuals, Groups and Institutions

- identify examples of institutions and describe the interactions of people with institutions;
- give examples of the role of institutions in furthering both continuity and change;
- show how groups and institutions work to meet individual needs and to promote the common good.

VI. Power, Authority and Governance

- explore the role of technology in communication, transportation, information-processing... or other areas as it contributes to or helps resolve conflicts.

VII. Production, Distribution and Consumption

- describe how we depend upon workers with specialized jobs and the ways in which they contribute to the production and exchange of goods and services.

VIII. Science, Technology and Society

- identify and describe examples in which science and technology have changed the lives of people...;
- identify and describe examples in which science and technology have led to changes in the physical environment;
- describe instances in which changes in values, beliefs and attitudes have resulted from new scientific and technological knowledge.

IX. Global Connections

- give examples of conflict, cooperation and interdependence among individuals, groups and nations;
- examine the effects of changing technologies on the global community.

X. Civic Ideals and Practices

- locate, access, organize and apply information about an issue of public concern from multiple points of view;
- recognize that a variety of formal and informal factors influence and shape public policy.

Goals and Objectives

Goal 1

To use an aeronautical timeline for a variety of purposes.

Objectives

The Learner will be able to:

- locate information on a timeline;
- recognize cause and effect from the information found on a timeline;
- perform basic research for information to be placed on such a timeline;
- organize research information to construct a simple timeline;
- identify major developments or issues found on such a timeline;
- interpret the information found on such a timeline;
- identify aeronautical researchers and their contributions;
- identify aviators and their contributions;
- identify important aircraft of each time period.

Goal 2

To understand that the progression of the science of aeronautics was and continues to be influenced by the technology of the time and historic events, as well as individuals and agencies or groups who worked to solve problems.

Objectives

The Learner will be able to:

- gather information from a variety of resources;
- identify important aspects of aeronautical history according to a specified category;
- chronicle important events, discoveries and innovations in aeronautics in a variety of formats.

Goal 3

To understand the role a government agency, such as NASA, plays in our evolving society.

Objectives

The Learner will be able to:

- identify the research contributions made by NASA;
- describe the impact NASA's aeronautical research has had and continues to have on everyday life;
- describe some of the various jobs in aeronautics;
- compare and contrast early aeronautics to modern aeronautics;
- cite examples of how NASA research has contributed to the aviation industry;
- describe how NASA has developed and used technology to improve aeronautics.

Goal 4

To understand how people's view of flying has changed over time and has increased our knowledge of aeronautics.

Objectives

The Learner will be able to:

- give examples of how mankind viewed flight during each age covered in the aeronautical "History" subsection;
- cite examples that demonstrate how the global community has been positively affected by the improvements in flight;
- use a variety of documents and sources to reconstruct major aeronautical events from different viewpoints.

Daily Lesson Planner

Preparation:

- Read the Teacher Informational Reading.

Day 1

- Facilitate a discussion of the history of flight.
- If possible, use a computer with television/projector connection to demonstrate how to navigate through the "History" subsection. See the first page of this section for instructions.

Day 2 - 6

- If you have access to more than one computer, partner students and assign each team a worksheet on the history of flight (see Student Worksheets in this section) and have students search through the "History" subsection to answer the questions (like a scavenger hunt!). The full assortment of five worksheets can be used to do this same activity for five sessions.

Day 7

- Do the "Bulletin Board Timeline" activity from the "Additional Student Activities" section.

Day 8

- Use the overhead of the NASA mission patches and their corresponding descriptions (See "Additional Student Activities".) to discuss the importance of the mission patches.
- Do the "Design a Patch" activity from the "Additional Student Activities" section.

Day 9

- Have students create their own history of flight crossword puzzle. (See "Student Crossword" in "Additional Activities".)
- Have students complete the "Brief History of Flight Timeline". (See "Student Worksheets" in this section.)

Day 10 - 12

- Have students use additional resources and the "History" subsection to research information about a historic aeronautical event. Have them create a "Radio Report" and record it on audio tape. (See the "Additional Student Activities" section.)

Day 13 - 14

- Have students research a famous aviator and write a poem about his/her achievement(s). (See "Poetry Writing" in the "Additional Student Activities" section.)

Day 15 - 16

- Have students create their own timelines. See "Other Timeline Topics" in this section which suggests some timeline themes.

  In section 4, Mathematics, a lesson entitled "Timeline Mechanics" can be used to help students with the mathematics involved in measuring out timelines.

Teacher Informational Reading
A Concise History of Flight

The beginning of aeronautics can be traced to the legends, myths and oral histories handed down through early civilizations (Chinese, Greek, Norse, African, Polynesian). Humankind's desire to fly has propelled us through the skies in many fashions. The Chinese entertained themselves with kites and early rocketry; others attempted to imitate the motion of birds in order to escape to freedom; and European tower jumpers, covered in feathers, attempted flight from high places. All of these innovators belonged to a unique group of dreamers.

The dreamers gave way to visionaries who made careful studies of bird flight, gravity and motion, which developed into principles and designs that slowly began laying the foundation for aeronautics and aerodynamics. Around 1500, Leonardo da Vinci correctly concluded that it was the shape and position of the bird's wing with respect to the air that enabled a bird to fly. Through his observations, he devised the first ornithopter (a mechanical bird) and also designed a lifting screw which was like a helicopter. In the late 1600s, Sir Isaac Newton formulated laws of gravity and motion which later provided the theoretical basis for rocketry and lift. Bernoulli's observations regarding air flow and air pressure furthered the understanding of lift. The lighter-than-air studies finally gave way to sustained flight when incorporated into a balloon design. The first design simply used hot air to fill and then lift a balloon. This was followed by the utilization of the lighter-than-air gas, hydrogen, to provide sustained lift. The contributions of the Montgolfier brothers and Professor Charles during the late 1700s enabled humans to not only rise above the ground for brief periods of time, but to control their up and down movement. However, they still could not control lateral movement (left and right) or any of the rotational motions (roll, pitch, and yaw).

The late 1800s brought continued experimentation in aerodynamics which produced the understanding of how wings really work, as well as improvements in wing design. Men like Penaud, Hargrave, Wenham, Phillips, Cayley and Chanute contributed greatly to the mass of research that was being compiled. Pioneers, like Lilienthal and the Wright Brothers, made the first momentous leaps into the world of flight. Lilienthal was the first to develop and fly manned gliders. Though some of Lilienthal's observations were incorrect, the Wright Brothers expanded his knowledge of aerodynamics through their own experimentation and launched the United States into the realm of powered flight. The continued research of Prandtl, Karman, Junkers, Moss and Rohrbach, plus other general technical and mechanical improvements, were embraced with enthusiasm by the leading aircraft manufacturers of the time. Fokker, Bleriot, Voisin, Curtiss and the Wright Brothers

all continued to contribute to improvements in wing, tail, propeller and fuselage design, which enabled planes to become faster and easier to maneuver.

The age of the great airships was ushered in and led by Zeppelin until safety factors began to outweigh the usefulness of the aircraft. Meanwhile, distance records were being broken. Bleriot crossed the English Channel (1909), Rodgers flew across the continental United States (1911), and the female aviator, Quimby, also crossed the English Channel (1912). The advent of World War I sent a message to all governments that airplanes would become an important force in battle. Curtiss continued his efforts to utilize aircraft launched from large ships. The need for additional research to assist in improving aircraft design was met with the institution of the National Advisory Committee for Aeronautics (NACA). At the same time, barnstormers of the 1920s were busy spreading the word about aviation to the public. The Stinson Sisters and African-American pilots like the "Flying Hobos", Banning and Allen, as well as Bullard and Coleman, promoted the importance of aviation across the country as they amazed the crowds with daredevil antics and aerobatics. The daring travels of Lindbergh, Byrd, Earhart, Amundsen and Batten continued to fire imagination, inspire courage and push the envelope of the study of aerodynamics. During this period the first autogyro, invented by de la Cierva, became the precursor to the modern helicopter.

The work of Goddard laid the foundation for future rocketry while aeronautics was still in its infancy, albeit maturing quickly. Research became prominent as more solutions were needed for the problems posed by extended flights, adverse weather conditions, higher-altitude flying and increased speed and maneuverability. The advent of World War II and the United States' impending involvement made the need for such solutions critical. Improvements in propellers and instrumentation, as well as the development of the jet engine, greatly expanded the variety of uses for aircraft. The development of the first practical single-rotor helicopter by Sikorsky added a new dimension to flight.

Research continued to pave the way for even greater aeronautical success with solutions provided by wind tunnel work. The deicing problem was solved after the refrigerated wind tunnel was invented. Wind tunnel work provided new designs for fuselage (the "wasp shape") and wing shape (the forward-sweep wing, the sweepback wing, and the oblique wing design created by R.T. Jones). Further research made it possible to "break the sound barrier" in 1947, as well as to continue on at speeds up to Mach 6.

The launching of the Russian space satellite, *Sputnik,* in 1957 brought a call to broaden NACA's mission to include space, and the National Aeronautics and Space Administration (NASA) was born in 1958. The "Space Race" went into high gear as research provided the information necessary to put a human into orbit.

The creation of the modern flight simulator in the late 1950s broadened the ability to research aerodynamic principles more safely. The improvements in computing led to Computational Fluid Dynamics (CFD – the study of how air flows around an object by programming a computer to model an aircraft design in various conditions). CFD made new aircraft development less costly during the design and testing phases. The creation of the supercomputers continued to influence and improve the work done in flight simulation and CFD.

Even though humankind has shifted their gaze from the azure skyline to the distant pinpoints of light seen in the night sky, aeronautics is still an extremely important field of engineering, and research is still a vital part of that field. The field of aeronautics continues to seek improved and safer ways to build and fly aircraft for not only subsonic, but also supersonic and hypersonic flight. Continued success in aircraft design and future space flight lies in further research and development of the aeronautical principles which were initiated more than three thousand years ago with the first kite.

Accompanying Materials

Student Worksheet: The Firsts in Flight 114

Student Worksheet: The People of Flight 115

Student Worksheet: Dates in the History of Flight 116

Student Worksheet: Aircraft 117

Student Worksheet: Technology and Aeronautics 118

Student Worksheet: Brief History of Flight Timeline 119

Student Worksheet: Brief History of Flight Timeline 120

Student Worksheet Keys 121

Activity: Bulletin Board Timeline 123

Activity: Timeline Topics 125

Activity: Design a Patch 126

Activity: Crossword Puzzle 129

Activity: Student Crossword Puzzle 130

Activity: Radio Report 131

Activity: Historical Radio Interviews 132

Activity: Writing a Cinquain 133

Critical Thinking Questions 134

Student Worksheet: The Firsts in Flight

Directions: Use the **Exploring Aeronautics** CD-ROM, "History" subsection to answer the following questions about first-time events in the history of flight. Answer each question by writing the information in the blank.

_____ 1. The first powered aircraft was flown by whom?

_____ 2. The first manned balloon was flown by the Montgolfiers in what year?

_____ 3. Who was the first African-American to pilot an airplane?

_____ 4. In 1881, Lilienthal piloted the first successful flights of what aircraft?

_____ 5. Who flew the first powered aircraft in Europe?

_____ 6. Who was named the first female commercial airline captain in 1968?

_____ 7. Who was the first aviator to fly solo around the world in 1933?

_____ 8. Quimby was the first female pilot to cross what channel in 1912?

_____ 9. The first parachute descent was made by Garnerin in what year?

_____ 10. The first ornithopter was developed by Hargrave in what year?

Student Worksheet: The People of Flight

Directions: Use the **Exploring Aeronautics** CD-ROM, "History" subsection to answer the following questions about the people who made tremendous contributions to the field of aeronautics. Write the name of the individual described in the blank.

_____ 1. This person invented the four stroke engine.

_____ 2. This German developed the great airships which flew in the early 1900s.

_____ 3. This Italian created early concept drawings of helicopters, but never built or flew them.

_____ 4. This scientist developed the "blunt nose" principle.

_____ 5. This scientist made many contributions to the development of aeronautical principles in the late 1800s.

_____ 6. This man is credited for being the "Father of Naval Aviation."

_____ 7. This woman was a glider test pilot for the Germans during WWII.

_____ 8. This researcher from NASA Ames Research Center developed the swept-back, swept-forward and oblique wing design.

_____ 9. This pioneer researcher invented the airfoil.

_____10. This aviation pioneer experimented in rocketry.

Student Worksheet: Dates in the History of Flight

Directions: Use the **Exploring Aeronautics** CD-ROM "History" subsection to find the year in which the events described below happened. Write the year in the blank.

_____ 1. The Supersonic Airliner, *Concorde*, flew its maiden voyage.

_____ 2. Charles Lindbergh made his historic solo flight across the Atlantic Ocean.

_____ 3. Louis Bleriot made his flight across the English Channel.

_____ 4. Sikorsky built the first practical single-rotor helicopter.

_____ 5. The Russian satellite, *Sputnik,* was launched.

_____ 6. The space shuttle was launched in this year.

_____ 7. Whittle invented the jet engine.

_____ 8. Airplane cabins were pressurized.

_____ 9. The first aircraft powered only by a human was flown.

_____10. Yeager broke the sound barrier.

Student Worksheet: Aircraft

Directions: Use the CD-ROM's "History" subsection to answer the following questions. Write the aircraft's name that is described in the blank.

_____ 1. The British and French governments built and still fly this supersonic airliner.

_____ 2. The explosion and fire of this dirigible ended the Age of Great Airships.

_____ 3. This satellite was launched by the U.S.S.R. in 1957 and began the "Space Race."

_____ 4. This airplane featured the first fully pressurized cabin in 1945.

_____ 5. This airplane was the first jumbo jet and was flown in 1970.

_____ 6. This airplane was designed to land and take off from the water, and featured a Curtiss water-cooled engine.

_____ 7. This airplane was designed as a long-range, reconnaissance plane, and was flown in 1966.

_____ 8. This airplane is considered by aviation experts to be one of the most important commercial transport planes of this time.

_____ 9. This airplane was used to fly across the English Channel in 1909 by its designer.

_____10. This experimental airplane design will help to define the next generation of space planes.

Student Worksheet: Technology and Aeronautics

Directions: Use the **Exploring Aeronautics** "History" subsection to find the year when the specified new technology was developed in the field of aeronautics. Write the year in the blank next to the description.

_____ 1. The supercomputer, *Cray-2*, was developed to run computations for new aircraft designs.

_____ 2. The swept-back wing design was perfected by Jones.

_____ 3. The jet engine was invented by Whittle.

_____ 4. Whitcomb designed the "wasp shape" fuselage.

_____ 5. The German dirigible *Hindenburg* was destroyed.

_____ 6. The "blunt nose" principle was developed which helped in the design of the *Mercury* capsule.

_____ 7. Rodert solved the deicing problem.

_____ 8. The "stressed skin" concept was developed by Rohrbach to decrease drag.

_____ 9. The boundary layer concept was fully developed which led to improved aircraft design for supersonic flight.

_____ 10. Phillips' early research on the airfoil laid the ground work for the understanding of how wings work.

Student Worksheet: Brief History of Flight Timeline

Directions: Use the **Exploring Aeronautics** "History" subsection to help you complete the entries on the blank timeline. Place the letter listed next to the event description in the blank on the timeline showing when the event took place.

A) Juan de la Cierva develops the first airworthy autogyro.

B) Rutan and Yeager fly the first non-stop, circumglobal flight in the *Voyager*.

C) Count von Zeppelin invents the airship.

D) Santos-Dumont flies the first aircraft in Europe.

E) Goddard begins his pioneering work in rocketry.

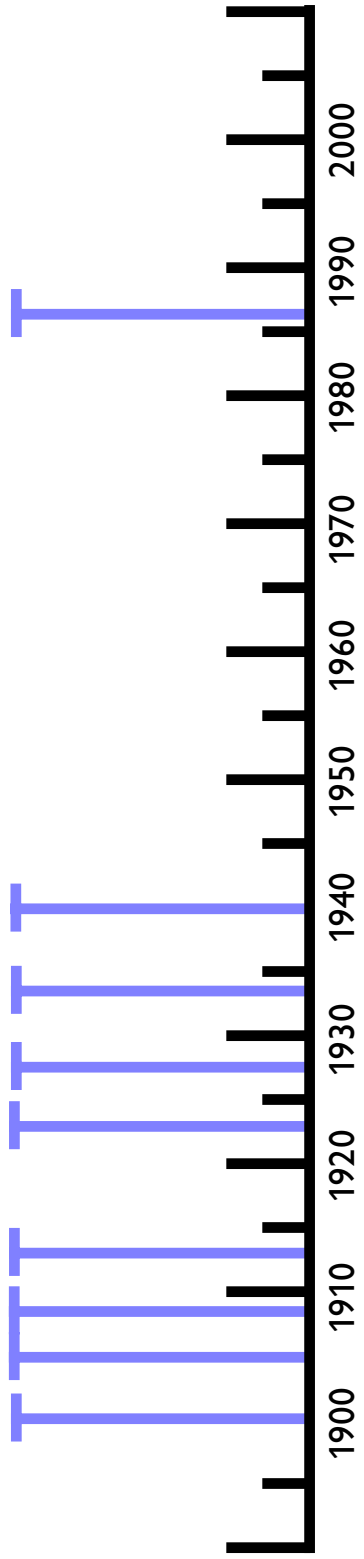
F) The Tuskegee Airmen perform successful air combat duty.

G) Wiley Post is the first to fly around the world solo.

H) Curtiss invents the hydroplane.

I) Bleriot crosses the English Channel in an airplane.

Student Worksheet: Brief History of Flight Timeline



Student Worksheet Keys

The Firsts in Flight

1. *Wright Brothers*
2. *1783*
3. *Bullard*
4. *glider*
5. *Santos-Dumont*
6. *Sintes*
7. *Post*
8. *English*
9. *1797*
10. *1893*

The People of Flight

1. *Otto*
2. *Hindenburg*
3. *da Vinci*
4. *Allen*
5. *Chanute*
6. *Curtiss*
7. *Reitsch*
8. *Jones*
9. *Phillips*
10. *Goddard*

Dates In The History of Flight

1. *1975*
2. *1927*
3. *1909*
4. *1939*
5. *1937*
6. *1981*
7. *1930*
8. *1940*
9. *1977*
10. *1947*

Aircraft

1. *Concorde*
2. *Hindenburg*
3. *Sputnik*
4. *Boeing 307-B Stratoliner*
5. *Boeing 747*
6. *hydroplane*
7. *SR-71*
8. *Boeing 777*
9. *Bleriot IV*
10. *X-33*

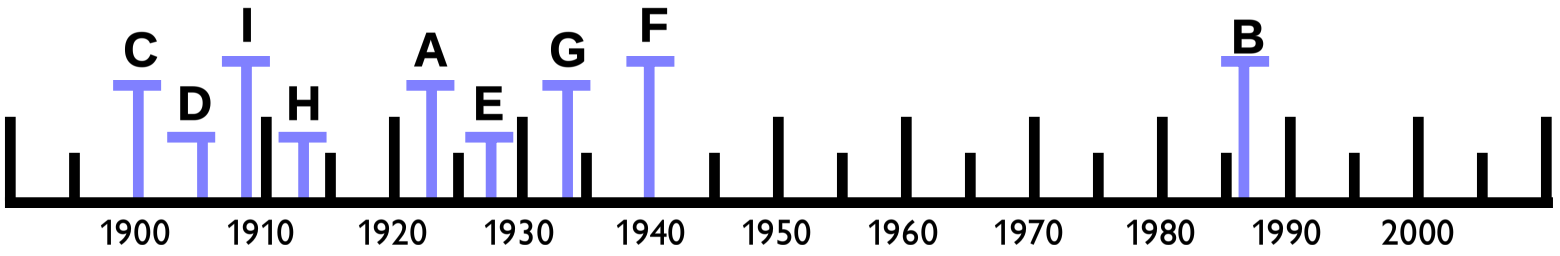
Technology and Aeronautics

1. *1984*
2. *1945*
3. *1933*
4. *1944*
5. *1937*
6. *1952*
7. *1942*
8. *1919*
9. *1904*
10. *1893*

Brief History of Flight Timeline

A. *1923*
B *1986*
C. *1900*
D. *1906*
E. *1926*
F. *1940*
G. *1933*
H. *1911*
I. *1909*

Student Worksheet:
Brief History of Flight Timeline
Key



Activity:
Bulletin Board Timeline

Place an oversized timeline on a wall, covering the dates from 1000 BC to 2015 AD. This timeline will act as a bulletin board. Have the students (as individuals, as partners, or in small groups) take notes on events in aeronautical history. Give the students fact cards to fill out with the information found in the "History" subsection. Students should then illustrate the event and place the fact card and the illustration at the appropriate place on the bulletin board timeline. Upon completion of this activity, the classroom will have a wall-size timeline for display throughout the unit.

Aeronautical Fact Card

Who:

What:

When:

Where:

Describe what happened:

Why do you think this is important:

Aeronautical Fact Card

Who:

What:

When:

Where:

Describe what happened:

Why do you think this is important:

Activity: Timeline Topics

Female Aviators Timeline

By using the information contained in the **Exploring Aeronautics** CD-ROM "History" subsection, students can design and illustrate a timeline that contains only the information about female aviators.

Technological Timeline

By using the information contained in the "History" subsection, students can design and illustrate a timeline that contains only the information dealing with breakthroughs in technological development which helped improve aviation and added to the research information being gathered on aeronautics.

Parallel Timeline

Create a parallel timeline that, on one side records the life and achievements of a famous aviator (Lindbergh, Yeager, a Wright Brother), and on the other side records historical aviation events or breakthroughs that occurred during the aviator's lifetime. This will require additional research on the part of the student.

Activity:
Design a Patch

Directions: Display NASA patches that commemorate each NASA space flight. Four examples from the Space Shuttle Program can be found on the next page. Discuss the intention of the patch design in that it is meant to reflect the work done on that particular mission. Point out the differences and similarities of the patches and then develop the requirements for a patch:

- graphics that show the primary work done on the mission;
- names of those involved;
- aircraft and its name pictured or featured;
- the mission's date.

Ask students to choose one aviation event found in the "History" subsection and illustrate it on a patch.

NASA Space Shuttle Flight Mission Patches

1. STS-31

2. STS-45

3. STS-48

4. STS-78

NASA Space Shuttle Flight Mission Patches
Background Information

1. STS-31

The mission insignia for STS-31 features the Hubble Space Telescope (HST) in its observing configuration against the background of the universe it will study. The cosmos includes a stylistic depiction of galaxies in recognition of the contribution made by Sir Edwin Hubble to our understanding of the nature of galaxies and the expansion of the universe. It is in honor of Hubble's work that this great observatory in space bears his name. The Space Shuttle trails a spectrum symbolic of both the red shift observations that were so important to Hubble's work and the new information which will be obtained with the HST. Encircling the scene are the names of the STS-31 crew members.

2. STS-45

This patch depicts the Space Shuttle launching from the Kennedy Space Center into a high inclination orbit. From this vantage point, the ATLAS (Atmospheric Laboratory for Applications and Science) payload can view Earth, the sun and their dynamic interactions against the background of space. Earth is prominently displayed and is the focus of the mission's space plasma physics and Earth science observations. The colors of the setting sun, measured by sensitive instruments, provide detailed information about ozone, carbon dioxide, and other gases which determine the Earth's climate and environment. Encircling the scene are names of the STS-45 flight crew members. The additional star in the ring containing the crew names is to recognize Alternate Payload Specialists and the entire ATLAS-1 team for their dedication and support of this "Mission to Planet Earth."

3. STS-48

This patch represents the Orbiter Discovery in orbit about the Earth after deploying the Upper Atmosphere Research Satellite (UARS) depicted in block letter style. The stars are those in the Northern Hemisphere as seen in the fall and winter when UARS will begin its study of the Earth's atmosphere. The color bands on the Earth's horizon, extending up to the UARS satellite, depict the study of the Earth's atmosphere. The triangular shape represents the relationship between the three atmospheric processes that determine upper atmospheric structure and behavior: chemistry, dynamics, and energy. This continuous process brings life to our planet and makes our planet unique in the solar system.

4. STS-78

This mission links the past with the present through a crew patch influenced by Pacific Northwest Native American art. Central to the design is the Space Shuttle Columbia whose shape evokes the image of an eagle, an icon of power and prestige and the national symbol of the United States. The eagle's feathers, representing both peace and friendship, symbolize the spirit of international unity on STS-78. An orbit surrounding the mission number recalls the traditional NASA emblem.

The Life Sciences and Microgravity Spacelab (LMS) is housed in Columbia's payload bay and is depicted in a manner reminiscent of totem art. The pulsating sun, a symbol of life, displays three crystals representing STS-78's three high-temperature microgravity materials processing facilities. The constellation Delphinus recalls the dolphin, friend of sea explorers, each star representing one member of STS-78's international crew. The color thrust rings at the base of Columbia signify the five continents of Earth united in global cooperation for the advancement of all humankind.

Activity:
Crossword Puzzle

Using the crossword puzzle template (see next page) or a crossword puzzle-making software program, students can create clues and answers based upon the "History" subsection and place them into a crossword puzzle format. In addition to the puzzle, students also need to create an answer key. These student-designed crossword puzzles can then be reproduced and worked by other students.

Activity:
Student Crossword Puzzle

Directions: Use the guide below to create your puzzle. Fill in the grid with the answers. Make sure that your answer in the grid shares the same number as the clue and that the word is spelled out in the appropriate way (across or down). Double check your spelling before you write the answer in the grid!

Clues:

ACROSS

1.

2.

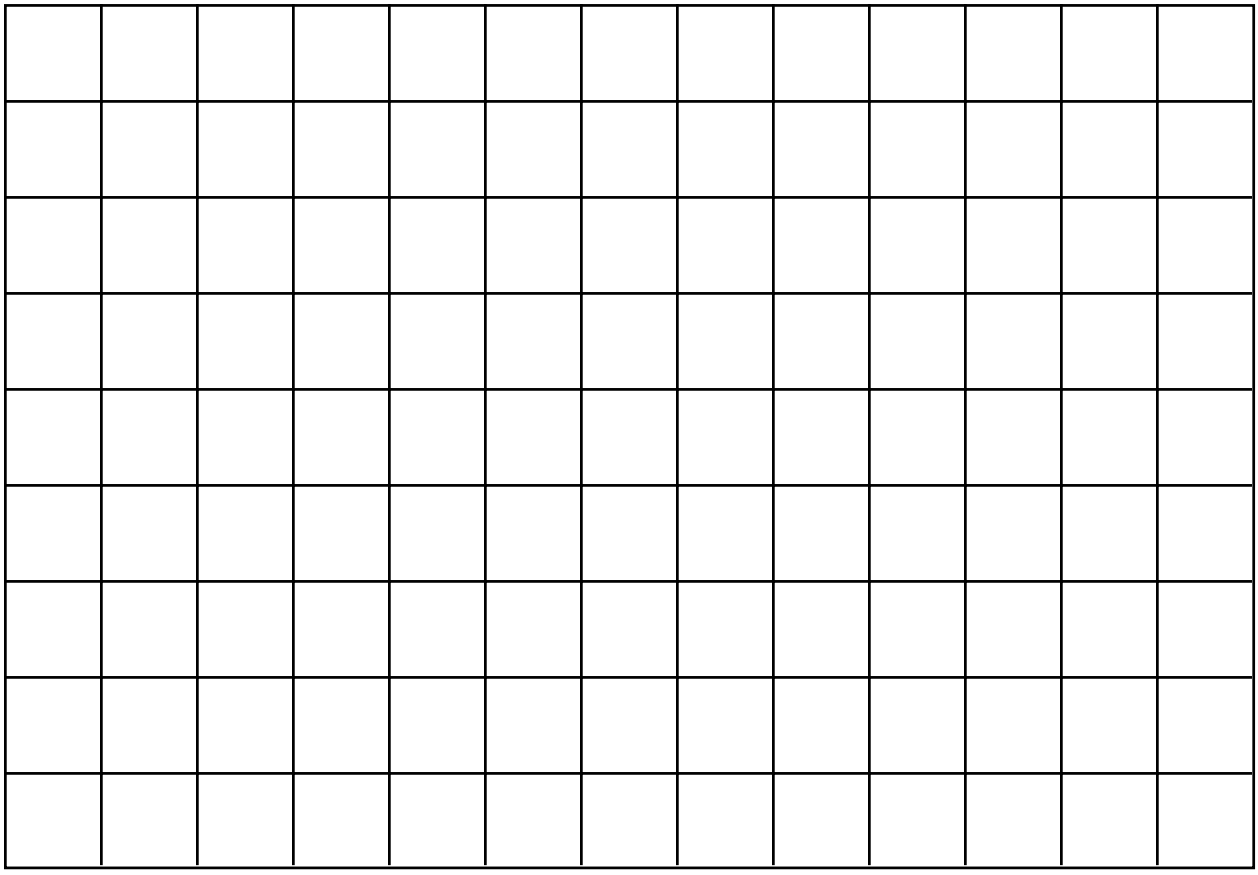
3.

DOWN

4.

5.

6.



Activity:
Radio Report

View a photograph of the Hindenburg disaster (or of Charles Lindbergh upon completion of his historical flight) and listen to a radio commentator's description of the event (or a radio interview done with Lindbergh after his historic solo crossing of the Atlantic). Students can work with a partner to do research and then compose a script in which one student portrays a famous aviator referred to in the "History" subsection and the other acts as an interviewer.The aviator has just completed his/her major accomplishment and is now being interviewed by a reporter.

Note: Some CD-ROM encyclopedias have an abbreviated version of the Hindenburg disaster with video and audio (Grolier's, for example).

Activity:
Historical Radio Interviews

Directions: You and a partner will choose an event from the "History" subsection, research that event and write an interview that will cover the important parts of the event. Make sure your information is historically accurate. Use the note taking guidesheet to help you organize your research on the event you have chosen. Then use the information to write an interview. One of you will be the aviator researcher, the other will be the interviewer.

Note Taking Guidesheet

Event:

Date:

People involved:

Special preparations (training, research) for event:

Weather during event:

Any particular problems encountered before and during the event:

A brief description of what this event was like for the people involved:

Activity: Writing a Cinquain

A cinquain is a popular form of poetry. It is similar in spirit to the image writings of the Japanese. It was created by the American poet Adelaide Crapsey and maintains a very strict syllable count. It is a five-line poem that follows this form:

Line 1: two syllables

Line 2: four syllables

Line 3: six syllables

Line 4: eight syllables

Line 5: two syllables

None of the lines are required to rhyme. The only requirement is the syllable count for each line. The title is separate from the five lines of the poem. Read the example of a cinquain below, about a method of flying described in the "History" subsection.

Parabolas

by Susanne Ashby

Up, down

Pull up, soar down

Feeling funny, floating

Liberated from gravity

Down, up

Choose an event or a person from the "History" subsection and create a cinquain.

Critical Thinking Questions

1. Why do you think scientists needed to create a refrigerated wind tunnel to do their research?
2. Why is having the airplane's cabin pressurized important to pilots and passengers?
3. Why do you think the box kite design is important to aerodynamics?
4. What problems did scientists have to solve before they could put an engine onto an airplane?
5. What were two problems of early flight?
6. Why is research still important to aeronautics?
7. What problems did scientists need to solve before they could break the sound barrier?
8. Why was the "blunt nose" principle important to future space flight?
9. What problems do you think scientists will have to solve before they can create a space plane that can take off from a runway on Earth, orbit the Earth, and land safely back on Earth?
10. Use a comparison chart to discuss the differences and similarities between bird flight and airplane flight.
11. During the early days of aeronautics what misconceptions did airplane designers have about flight?
12. Even though Chanute did not invent an airplane, why do you think he is important to aeronautics?
13. Summarize significant contributions that women have made to aeronautics.
14. Examine the relationship between the Soviet satellite's (*Sputnik*) launch in 1957 and the beginning of NASA in 1958.
15. Formulate a reason why we did not "break the sound barrier" until 1947.