From Kites to Space

A Brief History of Man in Space

by Rebecca F. Kinley Fraker

A Note to You:

This is the space history part of a unit that includes the Pathfinder Kite Honor. Each day I present some of the history of our entry into space, along with part of the Kite Honor.

In no way is this document a complete history of man in space. I hope it will encourage your students to look further into the history, and also investigate what is going on right now.

I encourage you to look at all the resources, and to find other space video clips. Students get quite excited and motivated when they see and hear history as it happened.

I was very young when President Kennedy challenged the nation to go to the moon. All these years later, I listened to that speech again. It is still inspirational today. As I researched, I found myself inspired by the space race, saddened by its tragedies, and anticipating my future space trip!

Please don't miss any part of this unit!

Rebecca K. Fraker

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Assignment: Check out some resources

Before you do anything else, check out these resources.

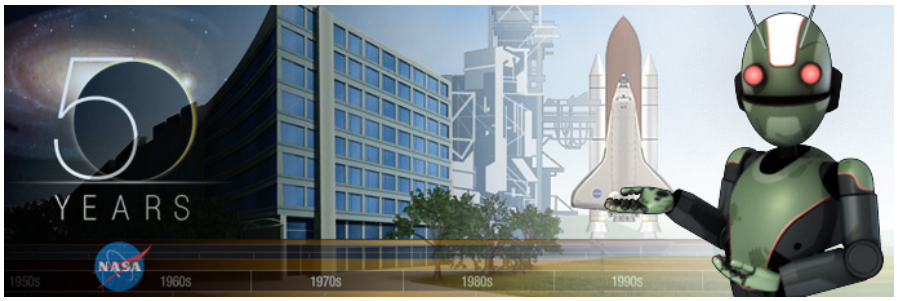
NASA History and Television

http://www.nasa.gov/topics/history/index.html

The NASA site is so huge and rich and complex that it can be difficult to discover all of its delights. This portal will help you access the history of mankind and space. No subscription is needed for the free videos.

NASA's First Fifty Years

http://www.nasa.gov/externalflash/50th/index.html



Take an interactive tour of NASA's first five decades of exploration, featuring virtual pavilions, clickable models and exhibits, video galleries, astronauts, presidents, and a robot guide named Automa. Brand new!

America in Space: NASA's First 50 Years

http://www.nasa.gov/externalflash/50th_book_gallery/

As the world remembers the dawn of the Space Age in 2007 and the golden anniversary of NASA in 2008, the historic legacy of the agency is captured in a new photo book, *America in Space*, published by Harry N. Abrams, Inc., New York.

The book uses nearly 500 stunning photographs to tell the agency's story, from the drama of lift-off to tension in mission control to the humor and humanity portrayed in the faces of astronauts, scientists, engineers, and political leaders.

Published in cooperation with NASA, the book features a foreword by Apollo 11 commander Neil Armstrong. This website has a gallery of the pictures.

Marshall Space Flight Center

http://www.nasa.gov/centers/marshall/home/index.html
Located in Huntsville, Alabama, the Marshall Space Flight Center is home to space and science and space exploration. This NASA site has links to NASA TV under "multimedia" and focuses more on the hard science and vehicles of space.

Kennedy Space Center

http://www.nasa.gov/centers/kennedy/home/index.html
http://www.kennedyspacecenter.com/
The Kennedy Space Center is located at Cape Canaveral in Florida. When President John F. Kennedy was killed, the area was named after him in recognition of his catapulting the country into the space race. This site has up-to-the-minute information about rocket and shuttle launches.

Johnson Space Center

http://www.nasa.gov/centers/johnson/home/index.html
The Mission Control Center at Johnson Space Center directs all space shuttle missions, including international space station assembly flights. MCC also manages all activity on board the international space station. JSC serves as the lead NASA center for the ***International Space Station*** -- a U.S.-led collaborative effort of 16 nations, and the largest, most powerful, complex human facility to ever operate in space. It was named after Lyndon B. Johnson. Lyndon B. Johnson became President upon the death of John F. Kennedy and took up the challenge of putting a man on the moon.

Encyclopedia Astronautica http://www.astronautix.com/index.html

Space Today Online http://www.spacetoday.org/History/History.html

Today in Space History http://todayinspacehistory.wordpress.com/

Assignment: A Brief History of Rocketry

Read the "A Brief History of Rocketry" section. List some of the **problems** that needed to be solved so that man could go to the moon and back again safely. (such as escaping the Earth's atmosphere, eating in no-gravity, getting down to and off the moon once you are there, etc.)

Assignment: Man in Space—A Timeline

Watch the powerpoint "Man in Space: A Timeline". Print out the "Man in Space: A Timeline For the Bulletin Board." There are many other events, such as Skylab, that took place during these years. Research and find other events to place on this timeline. Create a poster on an 8 x 12 sheet to illustrate each event. This is a great place to learn how to design a page that includes an imported picture.

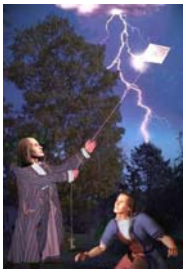
Assignment KITE: Man, Space and God

Read the first part of the Kite File "Man and Space . . . and God" and "The History of Kites". Prepare a reel and string for future kites. (This can be as simple as wrapping a string around a pencil.)

Assignment: Movie Day

Show a movie or movie clips showing the history of man's presence in space. These can be directly streaming from the NASA site, downloaded from Unitedstreaming or Powermedia Plus, or purchased new or used from Amazon.com or Ebay.com

Assignment KITE: Franklin's Kite



Read aloud stories from the Kite Honor packet "Maui"s Kite: A Legend" and "Benjamin Franklin: An Account of the Kite Experiment". While the reading is going on, students can act out the action. Divide the stories into sections and have students illustrate each section.

Assignment KITE: Kite Making & Terms

Download the Kite Plans packet. There are moviemaker files that go with each kite plan. Make the modified paper bag box kite and review kite terms and kite safety rules. Fly the kite outside if you can; if not, this is a great kite to fly in the classroom.

Assignment:"Space Speeches and Events"

Watch the moviemaker video "Space Speeches and Events". This video has Kennedy's famous speech "We choose to go to the moon", the Apollo 8 reading of the Creation story, and the first words on the moon. Some suggestions: Outline the reasons Kennedy gives for going into space. Find pictures to illustrate Apollo 8's reading in Genesis. If you had been the first man on the moon, what first words would you have said? What would you do in the weightless environment of space?

Assignment: Space Disasters (video clips)

Explore the three biggest disasters of the United States space program: The Apollo launch pad fire, the space shuttle Challenger's explosion, and the space shuttle Columbia's disintegration upon reentry.
**There is a very simple moviemaker movie available for this.

Assignment: Mission Patches

Read the section about Mission Patches and do the accompanying assignments and activities.

Assignment KITE: Make A Kite

**Moviemaker video files exist to make a choice of kites.

Assignment: The Hubble Telescope

**A moviemaker video file is available about the Hubble Telescope.
The incredible beauty of the pictures taken by the Hubble is very inspiring for art projects. Student art projects could include painting or coloring galaxies and planets, as well as the two projects shown in the packet.

Assignment KITE: Honor Questions

Use the kite honor requirements to check off the completed tasks. Complete another kite.

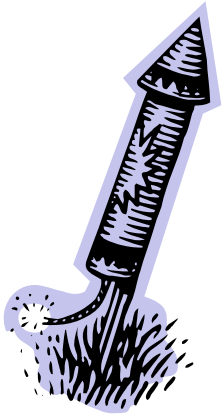
Assignment KITE: Kite Construction

There are other kites to make in the kite plans. Also, there are math lessons and aerodynamic information contained in the packet.

Assignment: Art Projects

The pictures taken by the Hubble Telescope almost make space look like God's art project! There are many beautiful pictures to be drawn and painted of space. Here are several art projects.

A Brief History of Rocketry



The earliest solid rocket fuel was a form of gunpowder, and the earliest recorded mention of gunpowder comes from China late in the third century before Christ. Bamboo tubes filled with saltpeter, sulfur and charcoal were tossed into ceremonial fires during religious festivals in hopes the noise of the explosion would frighten evil spirits. Some of them, instead of exploding, would fly out of the fire.

By 1045 AD the use of gunpowder and rockets was a part of Chinese military tactics. Chinese documents record the use of "fire arrows," small rockets. Chinese ordnance experts introduced and perfected many types of projectiles, including cannon and explosive grenades.

Rockets made their way across the continent, first adopted by the Arabs against the French in 1268, and then making their way into Italy, Germany, and finally England. The French Army was quick to adopt rockets into military operations.

Rockets came to the New World during the War of 1812. In 1814, the British used rockets against an American rifle battalion. A witness to the new threat to the Americans said that "never did men with arms in their hands make better use of their legs."

By 1846 a brigade of racketeers was authorized to accompany Major General Winfield Scott's expedition against Mexico. The Army's first battalion of rocketeers had about 150 men and was armed with about 50 rockets. They eventually forced the surrender of Mexico City.

As soon as the fighting in Mexico was over, the rocketeer battalion was disbanded, and the rockets were placed in storage. By the time they were hauled out in 1861 to use in the Civil War they had deteriorated. New ones were made, and were first used on July 3, 1862 when Maj. Gen. JEB Stuart's Confederate cavalry fired rockets at Maj. Gen. McClellan's Union troops at Harrison's Landing, VA.

Later in 1862, an attempt was made by the Union Army's New York Rocket Battalion to use rockets against Confederates defending Richmond and Yorktown, Virginia. It wasn't an overwhelming success. When ignited, the rockets skittered wildly across the ground, passing between the legs of a number of mules. One detonated harmlessly under a mule, lifting the animal several feet off the ground. It immediately deserted to the Confederate Army.

The only other documented use of rockets is at Charleston, S.C., in 1864. Union troops under Maj. Gen. Alexander Schimmelfennig found rockets "especially practical in driving off Confederate picket boats, especially at night."

As an interesting sidelight, the author Burke Davis, in his book "Our Incredible Civil War," tells a tale of a Confederate attempt to fire a ballistic missile at Washington, D.C., from a point outside Richmond, Va. According to the author, Jefferson Davis witnessed the event at which a 12-foot-long, solid-fueled rocket, carrying a 10-pound gunpowder warhead in a brass case engraved with the letters C.S.A., was ignited and seen to roar rapidly up and out of sight. No one ever saw the rocket land. It's interesting to speculate whether, almost 100 years before Sputnik, a satellite marked with the initials of the Confederate States of America might have been launched into orbit.

The international whaling industry developed rocket-powered, explosive-tipped harpoons which were most effective against the ocean-going whales. During the First World War, rockets were first fired from aircraft attempting to shoot down enemy hydrogen gas-filled observation balloons. Successes were rare and pilots resisted being asked to fire rockets from the highly flammable, cloth-and-varnish-covered wings of their biplanes.

The principal drawback to rockets throughout this period of development was the type of fuel. Both here and abroad, experiments were under way to develop a more powerful, liquid-propelled rocket. Two young men stand out in this effort -- one an American, Robert H. Goddard -- the other a German, Wernher Von Braun.

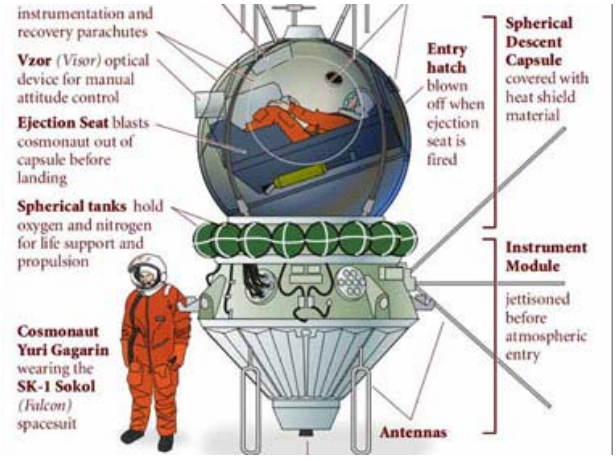
Wernher Von Braun was experimenting with explosives and fireworks by age 13. By the age of 24 he had earned his doctorate in physics and was directing Germany's military rocket development program. His dream was to go into space. Hitler and Nazi Germany instead used the scientists to develop the "vengeance weapon number two", the V-2 for short. The V-2 was the first successful long-range ballistic missile.

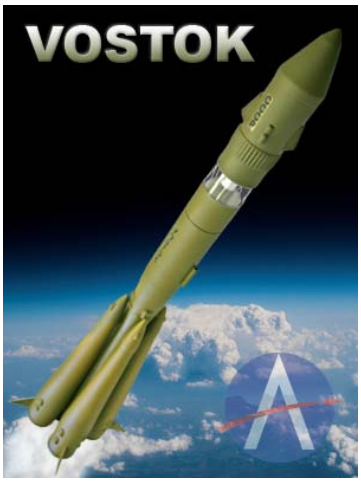
As WWII closed, the Nazis decided to kill Von Braun and the other rocket scientists to prevent their capture by the Allies. They did not want the knowledge getting into the hands of their enemies. Von Braun led his contingent of several hundred rocket scientists and engineers into American lines. Later, many of these scientists would come to America, while others went to Russia.

In America Von Braun discovered the work of American rocket pioneer Robert Goddard. While the Wright brothers were preparing to become the first men to fly, Goddard was already designing rockets to probe the upper atmosphere and go into space. He had come to the conclusion that if a rocket was going to get into space, it would have to be powered by liquid fuels. In 1919 he published a paper outlining his ideas and suggesting that a rocket should be flown to the moon. By the time he died in 1945, Goddard held 214 patents in rocketry, many of which are still being used today.

Publicity was far from Goddard's mind on the morning of March 16, 1926. On that day Goddard launched a liquid-powered rocket he had designed and built from a snow-covered field at his Aunt Effie Goddard's farm in Auburn, Mass. The rocket flew -- 152 feet -- about the same distance as the Wright Brothers' first manned flight -- but it did fly! It was the first flight of a liquid-fueled rocket in history.

With the fighting from WWII over, Von Braun and his team were heavily interrogated and jealously protected from Russian agents. V2s and V2 components were assembled. German rocket technicians were rounded up. In June, General Eisenhower sanctioned the final series of V2 launches in Europe. Watching each of the three V2s which rose from a launch site at Cuxhaven was a Russian Army colonel, Sergei Korolev. Ten years later, Korolev would be hailed as the Soviet Union's chief designer of spacecraft and the individual responsible for building the Vostok, Voshkod and Soyuz spacecraft which, since 1961, have carried all Soviet cosmonauts into orbit.





Most of Von Braun's team had already begun setting up shop at Fort Bliss, near El Paso, Texas. Piled up in the desert near Las Cruces, New Mexico, were enough parts to build 100 V2s. Von Braun and his team soon moved to nearby White Sands Proving Ground where work began assembling and launching V2s. By February 1946, Von Braun's entire team had been reunited at White Sands and, on April 16, the first V2 was launched in the United States. The U.S. space program was under way!

Up to 1952, 64 V2s were launched at White Sands. Instruments, not explosives, packed the missiles' nosecones. A V2 variant saw the missile become the first stage of a two-stage rocket named Bumper. The top half was a WAC Corporal rocket. The need for more room to fire the rockets quickly became evident and, in 1949, the Joint Long Range Proving Ground was established at remote, deserted Cape Canaveral, Fla. On July 24, 1950, a two-stage Bumper rocket became the first of hundreds to be launched from "the Cape."

The transfer of launch operations to the Cape coincided with the transfer of the Army's missile program from White Sands to a post just outside a north Alabama cotton town called Huntsville. Von Braun and his team arrived in April 1950 -- it was to remain his home for the next 20 years -- 20 years in which the city's population increased ten fold.

The Von Braun team worked to develop what was essentially a super-V2 rocket, named for the U.S. Army arsenal where it was being designed -- the Redstone. In 1956, the Army Ballistic Missile Agency was established at Redstone Arsenal under Von Braun's leadership to develop the Jupiter intermediate range ballistic missile. A version of the Redstone rocket, known as the Jupiter C, on January 31, 1958, was used to launch America's first satellite, Explorer I. Three years later, Mercury Redstones launched Alan Sheppard and Gus Grissom on suborbital space flights, paving the way for John Glenn's first orbital flight.

In 1958, NASA was established, and, two years later, Von Braun, his team, and the entire Army Ballistic Missile Agency were transferred to NASA to become the nucleus of the agency's space program.

The Marshall Space Flight Center in Huntsville, Alabama, pursued the course of developing rockets for space exploration. The past half century has been a time of superlatives. In 1961, Alan Sheppard rode a Marshall-designed Redstone rocket on a sub-orbital flight which made him the first American in space. President Kennedy committed this nation to being first on the Moon. NASA's Marshall Center was charged with developing the family of giant rockets which would take us there.

Saturn rockets were developed at Marshall to support the Apollo program. To honor President Kennedy's pledge, these rockets were, at the time, the most powerful space launch vehicles yet to have been invented. Engineers, scientists, contractors, and other support personnel built well. On July 20, 1969, Neal Armstrong spoke from the Moon's Sea of Tranquility and reported "The Eagle has landed."

Marshall's Saturn rockets first took us around the Moon, then to its cratered surface. Marshall-developed lunar excursion vehicles, nicknamed "Moon Buggies," carried astronauts on far-ranging journeys over the Moon in pursuit of samples of lunar soil and rock.

Closer to home, the team at Marshall developed America's first space station -- Skylab. Built to replace the upper stage of a Saturn V moon rocket, the Skylab module was successfully placed in orbit early on May 14, 1973. Placing Skylab in orbit marked a major transition in the story of rocketry. Up until Skylab, the rocket had been the star -- the featured attraction. The focus had been on the up and down -- launch and recovery.

Now for the first time, space became a place in which to live and work. Flying aboard a rocket became secondary to the work done once Skylab had been reached. The rocket, simply stated, became a means to an end -- the end in this case being the opportunity to learn to live and work in space.

A rash of malfunctions and problems tested the resourcefulness of the entire NASA team in Skylab's early day. The problems were overcome, however, and Skylab went on to become one of Marshall's proudest achievements.

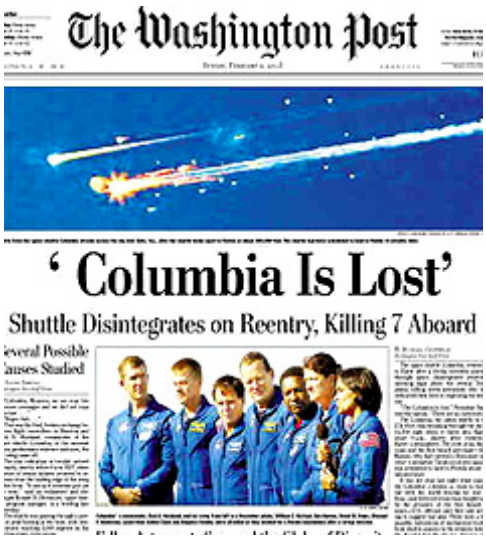
A Marshall-developed Saturn I-B also carried aloft America's half of the first joint U.S.-Soviet space endeavor, the Apollo-Soyuz project. After Apollo, the team at Marshall designed a revolutionary national space transportation system, which came to be known simply as "The Space Shuttle."

The space shuttle main engines are among the most powerful, most sophisticated devices ever invented. They represent a large leap in technology advancement over the engines which powered the Saturn V. Each of the three main engines in the tail of the shuttle can provide almost a half-million pounds of thrust, a thrust equal to that produced by all eight of the Saturn I's first stage engines. Unlike most previous rocket engines, which were designed to be used only once -- and then for only a few minutes -- the space shuttle's main engines are designed to be used again and again, for up to 7.5 hours. The thrust-to-weight ratio for these engines is the best in the world -- each engine weighs less than 7,000 pounds but puts out the power equivalent of seven Hoover Dams!

Twenty-four successful flights of the space shuttle lulled America into a sense of complacency. Shuttle launches became routine. Then came the Challenger disaster. Due to a combination of weather and a faulty o-ring in the joints of the solid rocket motors, the Challenger blew up shortly after take-off. It was witnessed by many who were watching the first "Teacher in Space".

Major steps were made at enhancing the reliability and safety of the turbine blades and turbo pumps in the shuttle's main engines. An escape system was implemented for the shuttle crew during leveled flight, and improvements were made to the orbiter's landing gear and brakes. On September 29, 1988, the shuttle program returned to flight with the launch of STS-26R.

However, after more successful launches another tragedy occurred. Space Shuttle Columbia completed a successful mission and left orbit. Shortly before landing, it broke apart in the skies over the United States. All of the astronauts were killed.

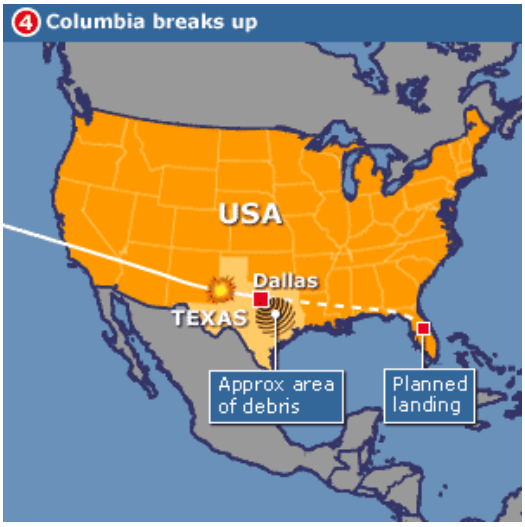

The Washington Post

‘ Columbia Is Lost’

Shuttle Disintegrates on Reentry, Killing 7 Aboard

The shuttles are now back in business but are slated to retire from service in 2010.

NASA now is using more expendable launch vehicles on missions which do not require the shuttle's unique capabilities, and is looking into development of a new generation of heavy lift launch vehicles. These will become the next chapter in the story of rocketry.



THE RACE TO THE MOON TIMELINE

Timeline of the U.S. space program, leading up to and following Apollo 11's historic 1969 moon landing.

April 9, 1959—NASA (the National Aeronautics and Space Administration) selects its first astronauts, known as the Mercury Seven.

April 12, 1961—Russian cosmonaut Yuri Gagarin is the first human to orbit Earth.

May 5, 1961—Alan Shepard is the first American in space. His suborbital flight lasts 15 minutes.

May 1961—President Kennedy challenges the nation to put a man on the moon before the end of the decade.

September 1962—NASA's second astronaut group includes Neil Armstrong, Jim Lovell and John Young.

October 1963—The third group includes Buzz Aldrin, Alan Bean, Gene Cernan, Michael Collins and Dave Scott.

Nov. 22, 1963—President Kennedy is assassinated.

June 1965—The fourth group of astronauts includes Harrison Schmitt.

April 1966—Charlie Duke and Edgar Mitchell are in the fifth astronaut group.

Jan. 27, 1967—Apollo 1 crew members Roger Chaffee, Ed White and Gus Grissom are killed by a fire in their spacecraft during a simulated countdown on the launch pad.

November 1967-October 1968—NASA launches several Saturn V rockets, culminating with the launch of Apollo 7, the first manned Apollo mission, in October.

Dec. 21-27, 1968—With the launch of Apollo 8, humans leave Earth's orbit for the first time. Frank Borman, Bill Anders and Lovell circle but do not land on the moon.

March 1969—Apollo 9 performs the first manned shakedown test of all Apollo lunar hardware in Earth's orbit, including the first manned flight of the lunar module. Crew members are James McDivitt, Russell Schweickart and Dave Scott.

May 18-26, 1969—Apollo 10 repeats the flight of Apollo 9 but in lunar orbit. The lunar module descends to within 10 miles of the lunar surface. The crew consists of Tom Stafford, John Young and Gene Cernan.

July 16-24, 1969—Apollo 11 is the first mission to land on the moon, and Neil Armstrong is the first human to walk on another world, on July 20, 1969. Buzz Aldrin, who also walks on the moon, and Michael Collins are his crew mates.

Nov. 14-24, 1969—Apollo 12 executes the first precision lunar landing, near the Surveyor III spacecraft, which had set down on the moon in April 1967. The crew consists of Charles "Pete" Conrad, Dick Gordon and Alan Bean.

April 11-17, 1970—An electrical fault in an oxygen tank causes an explosion that cripples the Apollo 13 command module on its way to the moon. On board are Jim Lovell, Fred Haise and Jack Swigert.

Jan. 31-Feb. 9, 1971—The third successful lunar landing touches down in the region of the moon originally designated for Apollo 13. Alan Shepard, Stuart Roosa and Edgar Mitchell make up the Apollo 14 crew.

July 26-Aug. 7, 1971—Apollo 15 is the first "extended stay" science mission on the moon. Dave Scott and Jim Irwin are the first to drive on the moon in a lunar rover. Alfred Worden pilots the command module.

April 16-27, 1972—Apollo 16 crew mates John Young and Charlie Duke are the first to venture beyond the flat, relatively smooth volcanic areas of the moon in a lunar rover. Thomas "Ken" Mattingly is the command module pilot.

Dec. 7-19, 1972—Apollo 17 commander Gene Cernan is the last man to walk on the moon after he and geologist-scientist Harrison Schmitt spend three days exploring a valley deeper than the Grand Canyon. Ron Evans pilots the command module.

(Source: NASA)

Mission Patches

Every time the shuttle lifts off on a mission, the crew members on board wear a unique mission patch which they themselves have designed. The mission patch is designed to symbolize the objectives of the mission and the character of the diverse crew. Even international and political factors are considered.

The whole idea of giving a unique patch to a unit or mission actually started during the Civil War when the Northern Army created special insignias to identify corps and divisions. This idea was revived during WWI and has continued ever since.

The creation of NASA in 1958 was the reaction of a nation that was shocked by the launch of the Soviet satellite Sputnik. Desperate, the U.S. government looked to the military to find suitable candidates to become astronauts. These men became the Mercury Seven, a team of former military test-pilots. Since they were from the military, they had a tradition of patches.

Because manned space flight was a relatively rare event (only a handful of missions per year), it was decided that patches should be created on a per-mission basis. Since then, almost every manned excursion into space has had its own corresponding mission patch. Today, over one hundred mission patches exist. With the help of NASA's Graphics Division and various merchandisers, these patch designs are marketed on souvenirs such as screensavers, decals, t-shirts, coffee cups, and pendants.

On July 24, 1969, the Apollo 11 Lunar Excursion Module touched down at the lunar Sea of Tranquility and astronaut Neil Armstrong took "one giant leap for mankind". At the same time, roughly 240,000 miles away, on the earth things were heating up involving the Apollo 11 patch.

President John F. Kennedy's commitment to put a man on the moon before 1970 started a race to put men on the moon. This had pitted the resources of one vast superpower against another. NASA and the United States won that race when Neil Armstrong stepped on the moon. The country was bursting with pride. America had beaten the Soviets to the moon, and everyone wanted a souvenir of the occasion.

That souvenir was the Apollo 11 mission patch. The patch design had a bald eagle, its wings outstretched, its claws grasping an olive branch as it prepared for a perfect moon landing. In a Cold-War era when Soviet communism threatened the Western world, that eagle stood for everything American. So the patch design became one of the most sought-after items in the space-collectibles industry, and a host of retailers strove to take advantage of Apollo fever.

Everybody wanted in on the action. Pretty soon, the Apollo emblem was on everything from alcohol to rock music. Just two days after the return of the Apollo 11 crew, NASA Administrator Thomas Paine enacted legislation making "unauthorized" possession of Apollo flight patches a federal offense.

NASA achieved the results they desired. Before this time, mission patches were available for unrestricted use. Now they were treated with respect similar to that of the seal of the President. The law remained on the books. To this day, the market for NASA insignias is closely safeguarded, but none quite as closely as the Apollo 11 patch was.

Over thirty years later, space shuttle astronauts continue to take a fierce pride in their mission patches. A patch is one of the first things that a crew works on together. The main goal is to symbolize the flight. Everyone tries to add a personal touch to it.

The patch design process usually begins shortly after the crew is assigned to a mission. After an informal meeting, one member of the crew will be assigned the position of 'graphics coordinator'. The job will be to work one-on-one with a representative from NASA's Graphics Division to communicate the ideas and desires of the crew to the technicians who will eventually construct a computer model of the patch.

The tradition of the mission patch is especially exciting for first-time fliers, who often consider their first mission patch to be a sort of status symbol. They are the ones who are most likely to take on the role of 'graphics coordinator'.

One of NASA's most critical space shuttle missions occurred in 1988. STS-26 came just two years after NASA suffered the devastating loss of the Challenger disaster. It was a

time when the general public and even some members of Congress viewed the space program with a mixed degree of skepticism and apprehension.

Astronaut Frederick Hauck commanded that flight and wanted the mission patch to express a new beginning for NASA. When the time came to design the patch, he turned to Stephen Hustvedt, his uncle and an accomplished artist.

"We didn't have any preconceived ideas, so I spoke with him," recalls Hauck. "He said 'well, what is the most important thing about your mission?' I said 'a safe flight'. So we drew the rocket launch representing a safe flight. We also have seven stars in a big dipper. We agreed as a crew that we wanted to include the seven stars to remind us of the seven friends killed on the Challenger. Additionally, we knew that NASA had been under this terrible loss and was working very hard to have a new beginning. What's more representative of a new beginning than a sunrise? So there is a sunrise there."

Once the crew has decided on a patch design, the designated graphics coordinator relays that design to the NASA graphics division, where a digital computer image is created. From there, it goes to NASA management for approval. After the insignia has been approved, it is sent to authorized patch/souvenir manufacturers, who create various products based on the patch design. From that point on, the patch is a permanant fixture in NASA history.

Both the collapse of communism and the birth of the International Space Station have initiated a new era. Instead of competing with each other, NASA and the Russian Aviation and Space Agency have forged a mutual alliance. This requires mission patch designers to make special international considerations when creating a patch.

For example, when plans were first drawn up to put an America astronaut on Mir, NASA decided to create a very general patch to commemorate the Shuttle/Mir program. The original design called for the patch to be surrounded by a black border. However, it was discovered that Russian culture associates the color black with bad luck. In an effort to appease these superstitions, the black border was replaced with a gold one.

The patch design for STS-79 also sparked some controversy. Created to symbolize the first shuttle/Mir docking, the original artist's sketch depicted a Russian and an American

astronaut shaking hands, the Russian flag on the left and the American flag on the right. To the artist, it seemed to be a harmless display of cooperation, but NASA management struck down this design. It was decided that in a show of patriotism, the American flag would always fly above or to the left of the Russian flag on all NASA emblems. The patch was redesigned.

It is expected that NASA and the Russian space agency will continue to be partners for a long time to come. This will create new cultural challenges as patch designers strive to paint the future in a canvas of thread.

To Learn more:

http://history.nasa.gov/mission_patches.html
At this site you can get the mission patch history and identification.

Assignment:

As a class, make a list of some future "missions." These might include "First mission of men to Mars," "Taking the first monkeys to the Moon," "Mining asteroids in space", and so on.

Now write each mission on a separate card. Form the class into groups of astronauts. Then have each group pull a mission but keep it secret from the other groups. The group must then come up with a "Mission Patch". Afterwards, see if the other groups can guess what your mission involves. (This activity can also be done individually or with a computer.)

Assignment:

NASA mission patches can be purchased very inexpensively on eBay. Another seller is "Space Patches" at http://www.spacepatches.nl/ and "The Space Store at http://www.thespacestore.com/patches1.html. These make an extremely attractive bulletin board that will keep bringing students back. They also make an attractive and coveted reward for the students. (author's note: As the unit progressed, many of my students became intrigued with one mission or another. I tried to get the patches from these missions. The patches generated a great deal of interest as students compared them and looked up more details about their mission.)

Buy and distribute mission patches, or cut, paste, and print pictures of the patches from the NASA website. Have students research their patches and report on its mission and the astronauts on it.


CAMERON
GODWIN
APT
ROSS
CHANG-DIAZ
MERCURY
9
FAITH
COOPER


BLAHA BAKER
LUCID ADAMSON LOW
SEDDON • GRIGGS • HOFFMAN
WALKER • GIANI
Columbia
YOUNG • CRIPPEN


BONDAR
HILMERS THAGARD MERBOLDT
IML-1
READDY GRABE OSWALD


BLAHA BAKER
LUCID ADAMSON LOW


Columbia
YOUNG • CRIPPEN


HENRICKS
GREGORY
MUSGRAVE 44
SOSA RHENEN


ADAMSON LEESTMA BROWN
SHAW RICHARDS


APOLLO 14
Shepard Roosa Mitchell


APPROACH AND LANDING TEST
Enterprise


LUCID WILLIAMS McCULLEY BAKER
CHANG-DIAZ


SHRIVER • BOLDEN
HAWLEY • McCANDLESS • SULLIVAN


MERCURY
9
FAITH 7
COOPER


APOLLO
NASA


BROWN CLARK CHAWLA ANDERSON
HUSBAND
MCCOOL
STS 107

Launch Pad Tragedy

January 27, 1967

Tragedy struck on the launch pad during a preflight test for Apollo 204, scheduled to be the first Apollo manned mission. (It was later renamed Apollo 1.)It would have been launched on February 21, 1967, but Astronauts Virgil Grissom, Edward White, and Roger Chaffee lost their lives when a fire swept through the Command Module (CM) as they were practicing.

Procedures for emergency escape called for a minimum of 90 seconds. But in practice the crew had never accomplished the routines in the minimum time. An astronaut, probably Chaffee, announced almost casually over the intercom at 6:31 PM: "Fire, I smell fire." Two seconds later, Astronaut White's voice was more insistent: "Fire in the cockpit."

Spacecraft technicians ran towards the sealed Apollo, but before they could reach it, the command module ruptured. Flame and thick black clouds of smoke billowed out. Many feared that the fire might set off the launch escape system atop Apollo. This, in turn, could ignite the entire service structure. Instinct told the men to get out while they could. Many did so, but others tried to rescue the astronauts.

The intense heat and dense smoke drove one after another back, but finally they succeeded. Unfortunately, it was too late. The astronauts were dead. Firemen arrived within three minutes of the hatch opening, doctors soon thereafter. A medical board determined that the astronauts died of carbon monoxide asphyxia, with thermal burns as contributing causes. The board could not say how much of the burns came after the three had died. Doctors treated 27 men for smoke inhalation. Two were hospitalized.

Challenger Disaster

Shuttle mission 51L was much like most other missions. Seventy three seconds into the mission, the Challenger exploded, killing the entire crew. Challenger was a NASA tragedy.

NASA's Shuttle program was begun in the 1970s, to create reusable craft for transporting cargo into space. Previous space craft could only be used once, then were discarded. The first shuttle, Columbia, was launched in 1981. One year later, the Challenger rolled off the assembly line as the second shuttle of the US fleet. They were followed by Discovery (1983) and Atlantis (1985).

The Challenger flew nine successful missions before the disaster in 1986. Seventy-three seconds into mission 51L, the Challenger exploded, killing the entire crew.

Shuttle mission 51L was much like most other missions. The Challenger was scheduled to carry some cargo, the Tracking Data Relay Satellite-2 (TDRS-2), as well as fly the Shuttle-Pointed Tool for Astronomy (SPARTAN-203)/Halley's Comet Experiment Deployable, a free-flying module designed to observe the tail and coma of Halleys comet with two ultraviolet spectrometers and two cameras.

One thing made this mission unique. It was scheduled to be the first flight of a new program called TISP, the Teacher In Space Program. The Challenger was scheduled to carry Sharon Christa McAuliffe, the first teacher to fly in space.

Selected from among more than 11,000 applicants from the education profession for entrance into the astronaut ranks, McAuliffe was very excited about the opportunity to participate in the space program. "I watched the Space Age being born and I would like to participate." McAuliffe was planning to teach a lesson from space, and so school children around the world were tuned into the broadcast of the liftoff.

Besides McAuliffe, the Challenger crew consisted of mission commander Francis R. Scobee; pilot Michael J. Smith; mission specialist Ronald E. McNair, Ellison S. Onizuka, and Judith A. Resnik; and payload specialist Gregory B. Jarvis. Christa McAuliffe was also listed as a payload specialist.

From the beginning, though, Shuttle Mission STS-51L was plagued by problems. Liftoff was initially scheduled for at 3:43 p.m. EST on January 22, 1986. It was rescheduled several times because of hardware and weather problems.

During this delay, the cross winds exceeded limits at KSC's Shuttle Landing Facility. There was a final delay of two hours when a hardware interface module in the launch processing system, which monitors the fire detection system, failed during liquid hydrogen tanking procedures. The Challenger finally lifted off at 11:38:00 a.m. EST.

Seventy three seconds into the mission, the Challenger exploded, killing the entire crew. The cause was later determined to be an O-ring that failed because of the cold weather.

On that 1986 day, the Space Shuttle was still shiny and new, and the nation had dreams that everyone would one day being able to fly into space with no training required. We had evidence that it could happen; in 1985, Senator Jake Garn had flown for no obvious reason other than that he had the ability to pull enough strings, and now a teacher would fly because NASA saw sending teachers to space as a great way to get kids interested in space.

The watching nation was stunned as it slowly became obvious that something was not right. Thousands of school children were watching, including McAuliffe's own young children. In many schools that day, teachers had pulled their children into auditoriums and lined them up in rows before TVs. They were there to be inspired. This crew had a role model for everyone: African-American astronaut and physicist Ronald McNair, female astronaut and engineer Judy Resnik, Japanese-American astronaut and engineer Ellison Onizuka. And for those not wanting a PhD in science, math, engineering or technology, there was the teacher, Christa McAuliffe, showing that space belonged to truly everyone.

Most of the Challenger ended up in the Atlantic Ocean. It took many weeks before all of the crew were retrieved from the ocean's bottom. The astronauts were buried in Arlington Cemetery where today there is a monument.


Challenger debris washes ashore at Cocoa Beach, Florida (CNN)


NASA

Address to the Nation on the Challenger Disaster

by President Ronald Reagan
Oval Office January 28, 1986

A few hours after the disaster, this speech was delivered to the American people via nationwide radio and television. To hear it as it was given, download the movie "Space Disasters" or find it online at "American Rhetoric".



"Ladies and gentlemen, I'd planned to speak to you tonight to report on the state of the union, but the events of earlier today have led me to change those plans. Today is a day for mourning and remembering. Nancy and I are pained to the core by the tragedy of the shuttle Challenger. We know we share this pain with all of the people of our country. This is truly a national loss.

Nineteen years ago, almost to the day, we lost three astronauts in a terrible accident on the ground. But we've never lost an astronaut in flight; we've never had a tragedy like this. And perhaps we've forgotten the courage it took for the crew of the shuttle; but they, the Challenger Seven, were aware of the dangers, but overcame them and did their jobs brilliantly. We mourn seven heroes: Michael Smith, Dick Scobee, Judith Resnik, Ronald McNair, Ellison Onizuka, Gregory Jarvis, and Christa McAuliffe. We mourn their loss as a nation together.

For the families of the seven, we cannot bear, as you do, the full impact of this tragedy. But we feel the loss, and we're thinking about you so very much. Your loved ones were daring and brave, and they had that special grace, that special spirit that says, "Give me a

challenge and I'll meet it with joy." They had a hunger to explore the universe and discover its truths. They wished to serve, and they did. They served all of us.

We've grown used to wonders in this century. It's hard to dazzle us. But for 25 years the United States space program has been doing just that. We've grown used to the idea of space, and perhaps we forget that we've only just begun. We're still pioneers. They, the members of the Challenger crew, were pioneers.

And I want to say something to the school children of America who were watching the live coverage of the shuttle's takeoff. I know it is hard to understand, but sometimes painful things like this happen. It's all part of the process of exploration and discovery. It's all part of taking a chance and expanding man's horizons. The future doesn't belong to the fainthearted; it belongs to the brave. The Challenger crew was pulling us into the future, and we'll continue to follow them.

I've always had great faith in and respect for our space program, and what happened today does nothing to diminish it. We don't hide our space program. We don't keep secrets and cover things up. We do it all up front and in public. That's the way freedom is, and we wouldn't change it for a minute. We'll continue our quest in space. There will be more shuttle flights and more shuttle crews and yes, more volunteers, more civilians, more teachers in space. Nothing ends here; our hopes and our journeys continue.

I want to add that I wish I could talk to every man and woman who works for NASA or who worked on this mission and tell them: "Your dedication and professionalism have moved and impressed us for decades. And we know of your anguish. We share it."

There's a coincidence today. On this day 390 years ago, the great explorer Sir Francis Drake died aboard ship off the coast of Panama. In his lifetime the great frontiers were the oceans, and a historian later said, "He lived by the sea, died on it, and was buried in it." Well, today we can say of the Challenger crew: Their dedication was, like Drake's, complete.

The crew of the space shuttle Challenger honored us by the manner in which they lived their lives. We will never forget them, nor the last time we saw them, this morning, as they prepared for their journey and waved good-bye and "slipped the surly bonds of earth" to "touch the face of God.""

Challenger Crew.

Columbia Disaster

February 1, 2003 started on a bright note for the crew of STS-107 aboard the Space Shuttle Columbia. They were awakened by a rousing rendition of "Scotland the Brave" in honor of mission specialist Laurel Clark's Scottish heritage. Mission Control followed the wake-up tune with news the astronauts had been waiting for. It was time to come home.

The seven members of the crew (commander Rick Husband, pilot Willie McCool and mission specialists Kalpana Chawla, Laurel Clark, Mike Anderson, David Brown and Israeli payload specialist Ilan Ramon) were coming to the end of a 16 day successful mission of scientific experimentation, the first shuttle mission in two years that did not visit the International Space Station or Hubble Space Telescope.

As Columbia was making final preparations for landing, their families were journeying to Kennedy Space Center to watch their loved ones' homecoming. Columbia and her crew were scheduled to land at Space Center at 9:16 a.m. There was much excitement in both places.

Shortly before 9:00AM EST, Mission Control spotted a sensor problem. There was a loss of data from the left wing temperature sensors. This was followed by a data loss from tire pressure indicators on the left main landing gear. Although this was a problem, it could have simply been a communication glitch. There were procedures in place to deal with it.

Mission Control contacted the shuttle: "Columbia, Houston, we see your tire pressure messages and we did not copy your last."

They received a reply from Columbia's commander, Rick Husband, "Roger, uh, buh . . . "

There was nothing more for several seconds; then, they received only static.

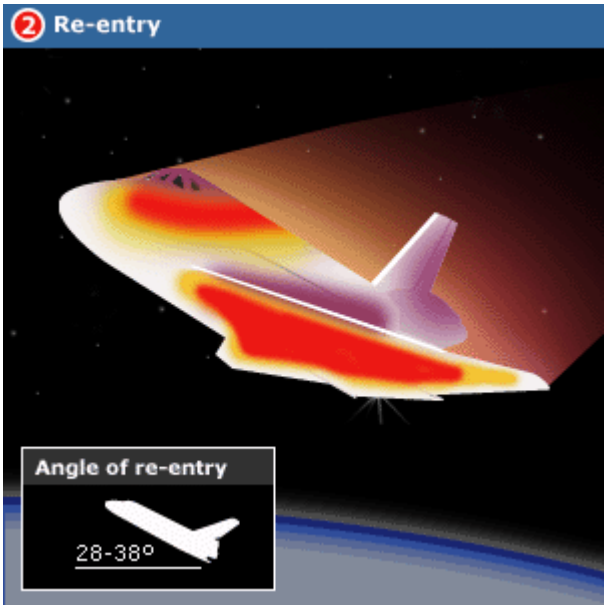
The shuttle was traveling at 12,500 mph, 18 times the speed of sound, 39 miles above the Earth, when people in Texas, Arkansas, and Louisiana heard unusual sounds coming from the sky. Many who were watching to see the shuttle pass overhead reported seeing debris separating from the vehicle. This was a clear indication that something was wrong. Minutes later, NASA announced that a Space Shuttle Contingency had been declared.

By nightfall, with debris spread across a large portion of Texas and into Louisiana, the search was put on hold until morning. The search for debris and bodies took weeks, and thousands of civilians helped. Pieces were found in swamps and on tops of buildings. Many astronauts quietly helped search as well. The search for answers took much longer.

Columbia was outfitted with more than 25,000 tiles that shielded the craft from the extreme heat of re-entry into Earth's atmosphere. Damaged or missing tiles could cause the vehicle to break up.

Two days after the catastrophe, NASA admitted that "we may never know the exact root cause" of the Columbia disaster, and acknowledged that agency analysts may have been wrong when they concluded the craft had not been seriously damaged by a flying chunk of debris that apparently struck tiles on the underside of the left wing during liftoff.

Less than two minutes after the launch, a 20-inch piece of debris, possibly brown insulating foam weighing 2 1/2 pounds, broke off the shuttle's external fuel tank. This possibly damaged the heat tiles enough to cause the overheating on the way down.



Address to the Nation Concerning Columbia Disaster

By President George W. Bush

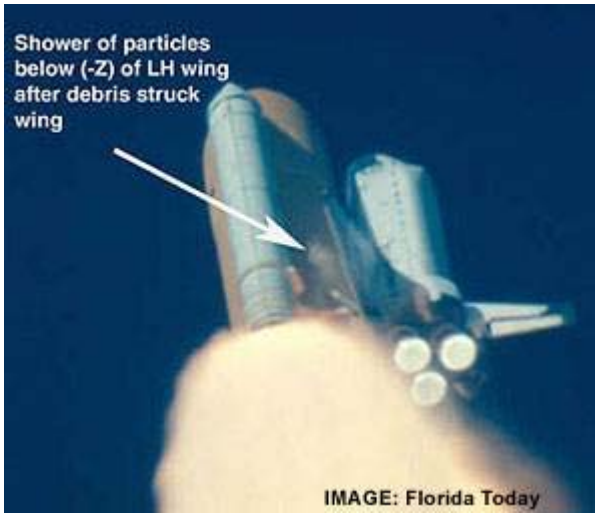
My fellow Americans, this day has brought terrible news and great sadness to our country. At nine o'clock this morning, Mission Control in Houston lost contact with our Space Shuttle Columbia. A short time later, debris was seen falling from the skies above Texas. The Columbia is lost; there are no survivors.

On board was a crew of seven: Colonel Rick Husband; Lt. Colonel Michael Anderson; Commander Laurel Clark; Captain David Brown; Commander William McCool; Dr. Kalpana Chawla; and Ilan Ramon, a Colonel in the Israeli Air Force. These men and women assumed great risk in the service to all humanity.

In an age when space flight has come to seem almost routine, it is easy to overlook the dangers of travel by rocket, and the difficulties of navigating the fierce outer atmosphere of the Earth. These astronauts knew the dangers, and they faced them willingly, knowing they had a high and noble purpose in life. Because of their courage, and daring, and idealism, we will miss them all the more.

All Americans today are thinking, as well, of the families of these men and women who have been given this sudden shock and grief. You're not alone. Our entire nation grieves with you. And those you loved will always have the respect and gratitude of this country. The cause in which they died will continue. Mankind is led into the darkness beyond our world by the inspiration of discovery and the longing to understand.

Our journey into space will go on.



In the skies today we saw destruction and tragedy. Yet farther than we can see, there is comfort and hope. In the words of the prophet Isaiah, "Lift your eyes and look to the heavens. Who created all these? He who brings out the starry hosts one by one and calls them each by name. Because of His great power, and mighty strength, not one of them is missing."

The same Creator who names the stars also knows the names of the seven souls we mourn today. The crew of the shuttle Columbia did not return safely to Earth; yet we can pray that all are safely home.

May God bless the grieving families. And may -- may God continue to bless America.

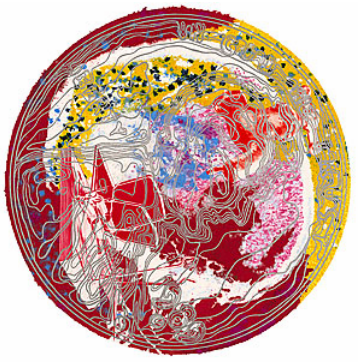
Art: Collage Planets

Materials needed: 9" x 12" white cardstock
Colorful magazine pages (Creation, Ranger Rick, My Big Backyard, Birds & Blooms and old nature calendars are great for this.)
Scissors
Glue sticks or rubber cement
A way of making a large circle.

Step 1: Cut irregular strips and shapes from the most colorful sections of magazine pages.

Step 2: Cover one side of the cardstock. Pieces may overlap. Allow to dry.

Step 3: Draw the largest circle possible on the back of the cardstock. Now cut it out.



Step 4: You have now created a planet. Give the planet a name and describe it. Invent a species of animal and a plant for it. Write this neatly and add to the back.

Step 5. Punch a hole in the top of the planet. Tie a long string on it and hang it from the ceiling. Make them hang low enough so that other members of the class can enjoy a stroll through the planetary system that your class has created.

Art: Optical Illusion

Materials Needed: 2 pieces of cardstock per student
2 large space-related pictures
ruler
pencil
glue sticks or rubber cement
Scotch tape

Step 1: Tape the 8" ends together.

Step 2: Start at one end and draw lines the width of the ruler you are using. Do not trade rulers with anyone. Some rulers are wider than others. Don't worry about that. Just try to get the lines straight and parallel. Put aside.

Step 3: Now flip over the pictures and draw the same lines with the same spacing on the back of the pictures.

Step 4: Take one of the pictures and cut along the lines. This will give a group of strips. Reassemble them right side up.

Step 5. Now, start at the left and glue the strips one at a time onto every other space on the cardstock. There will be white strips showing between each picture strip.

Step 6. Next, cut the second picture into strips. Glue it on the white strips, again in the order of the picture.

Step 7: When the glue on the project has dried, fold it back and forth like a fan.

Step 8: Keeping it slightly compressed, fasten it up on a bulletin board or wall at eye level. Slowly walk from one side to the other. As you pass the picture, it should change from one view to the next.

Space Firsts

http://space.about.com/cs/basics/a/spacefirsts.htm

The first Earthling in space:

Laika, a dog, was launched into space on the Sputnik 2 in 1957. She survived the launch and for a time in space, but after a week, the air ran out and Laika died. The following year, as its orbit deteriorated, the craft exited space and re-entered the Earth's atmosphere and, without heat shields, burned up along with Laika's body.

The first human in space:

Yuri Gagarin, a cosmonaut from the USSR, launched into space on April 12, 1961 aboard the Vostok 1. His flight lasted one hour and forty-five minutes, orbiting the Earth one time. Describing the view of the Earth from space, Gagarin radioed, "It has a very beautiful sort of halo, a rainbow."

The first American in space:

Alan Sheppard was launched into space aboard Mercury 3 on May 5, 1961 to become the first American in space. His craft did not achieve orbit, but rose to a height of 116 miles and traveled 303 miles before safely parachuting into the Atlantic Ocean.

The first American to orbit the Earth:

On February 20, 1962, the Friendship 7 capsule carried astronaut John Glenn around the Earth 3 times on a 5 hour space flight. He was the first American to orbit the earth.

The first woman in space:

Valentina Tereshkova flew in space aboard the Vostok 6 on June 16, 1963.

The first American woman in space:

On June 18, 1983, the space shuttle Challenger lifted off with Sally Ride aboard. She was the first American woman in space.

The youngest American in space:

Besides being the first American woman in space, Sally Ride was also the youngest American when she rode the Challenger in 1983.

The first person to make a second trip into space:

Gemini 3, the first piloted Gemini flight, included Virgil "Gus" Grissom among its crew as it lifted off in March of 1965. He had previously flown in space in July, 1961 aboard the second suborbital Mercury mission.

The first African American in space:

August 30, 1983, the space shuttle Challenger lifted off with Guion "Guy" Blueford Jr., the first African American in space.

The first African American woman in space:

Mae Jemison lifted off in the space shuttle Endeavour on September 12, 1992, first African American woman in space.

The first space walk:

Alexei Leonov, a Soviet cosmonaut, was the first person to step outside of his spacecraft while in Outer Space, on March 18, 1965. He spent 12 minutes as he floated as far as 17.5 feet from his Voskhod 2 craft, enjoying the first space walk ever.

The first American to walk in space:

During the Gemini 4 mission, Ed White made a 21-minute EVA (Extra-Vehicular Activity), also known as a space walk.

The first American woman to pilot a spacecraft:

Eileen Collins piloted the space shuttle Discovery in 1995.

The first man on the moon:

With his famous words, "That's one small step for man, one giant leap for mankind." Neil Armstrong, on the Apollo 11 mission, stepped onto the Lunar surface on July 20, 1969, becoming the first man on the Moon.

The second human to step on the moon:

Armstrong's Apollo 11 crewmate, Buzz Aldrin, was the second person to step on the moon, also on July 20, 1969.