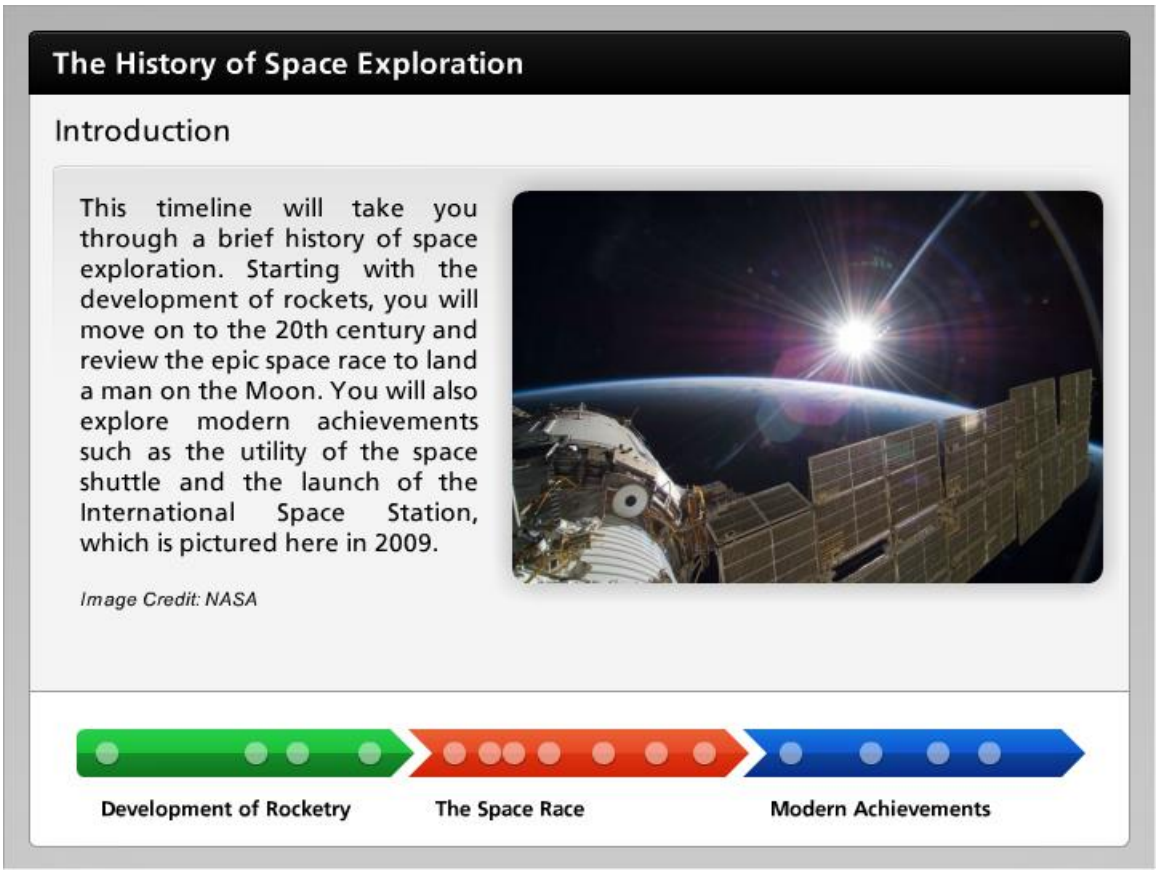
Module 10: Astronomical Organizations and Space Exploration
Topic 1 Content: The History of Space Exploration

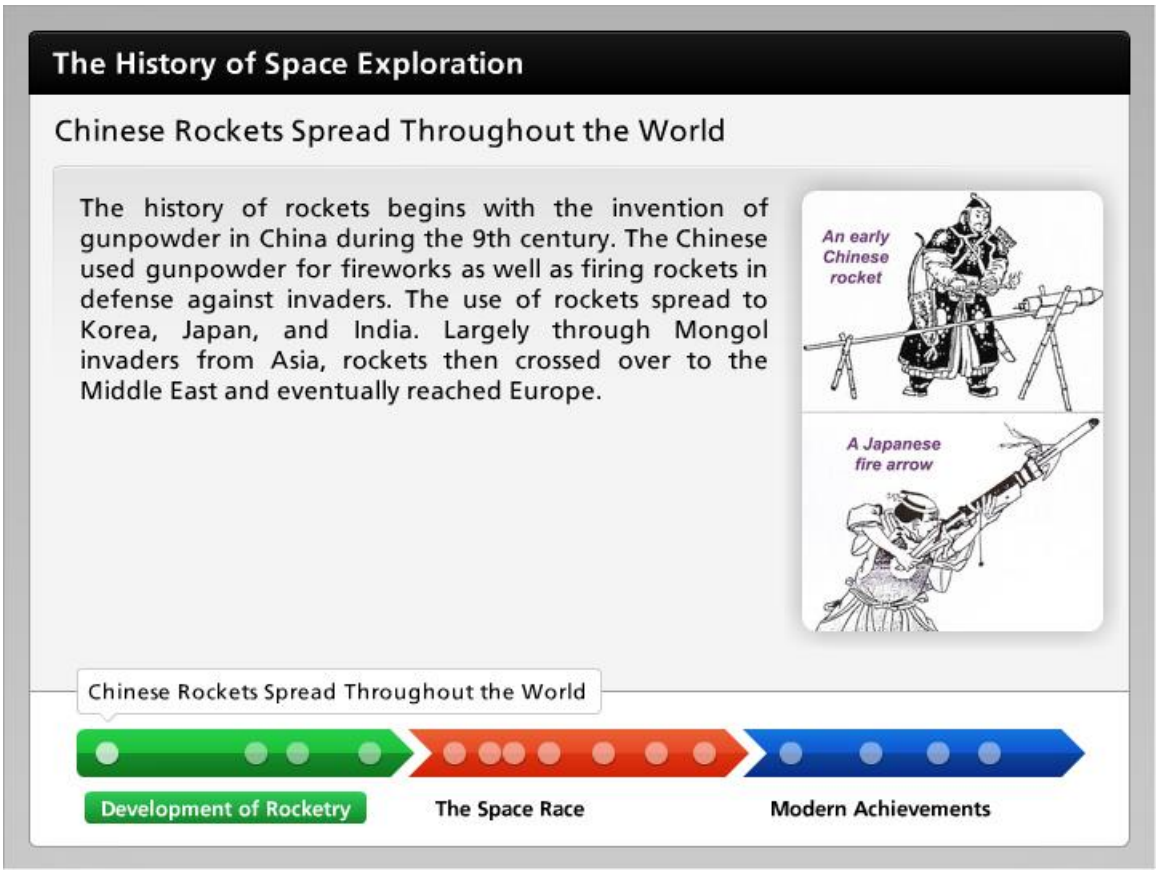
Introduction



This timeline will take you through a brief history of space exploration. Starting with the development of rockets, you will move on to the 20th century and review the epic space race to land a man on the Moon. You will also explore modern achievements such as the utility of the space shuttle and the launch of the International Space Station, which is pictured here in 2009.

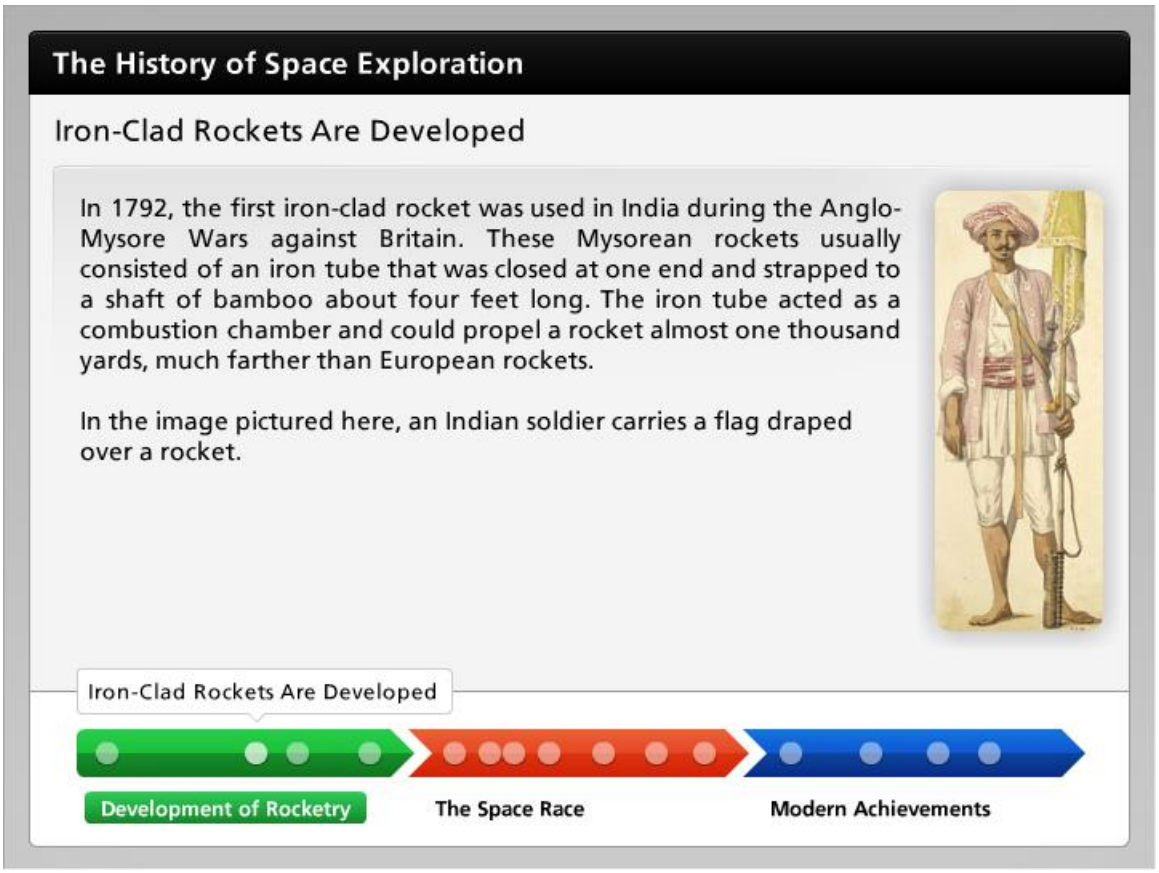
Image Credit: NASA

Chinese Rockets Spread Throughout the World



The history of rockets begins with the invention of gunpowder in China during the 9th century. The Chinese used gunpowder for fireworks as well as firing rockets in defense against invaders. The use of rockets spread to Korea, Japan, and India. Largely through Mongol invaders from Asia, rockets then crossed over to the Middle East and eventually reached Europe.

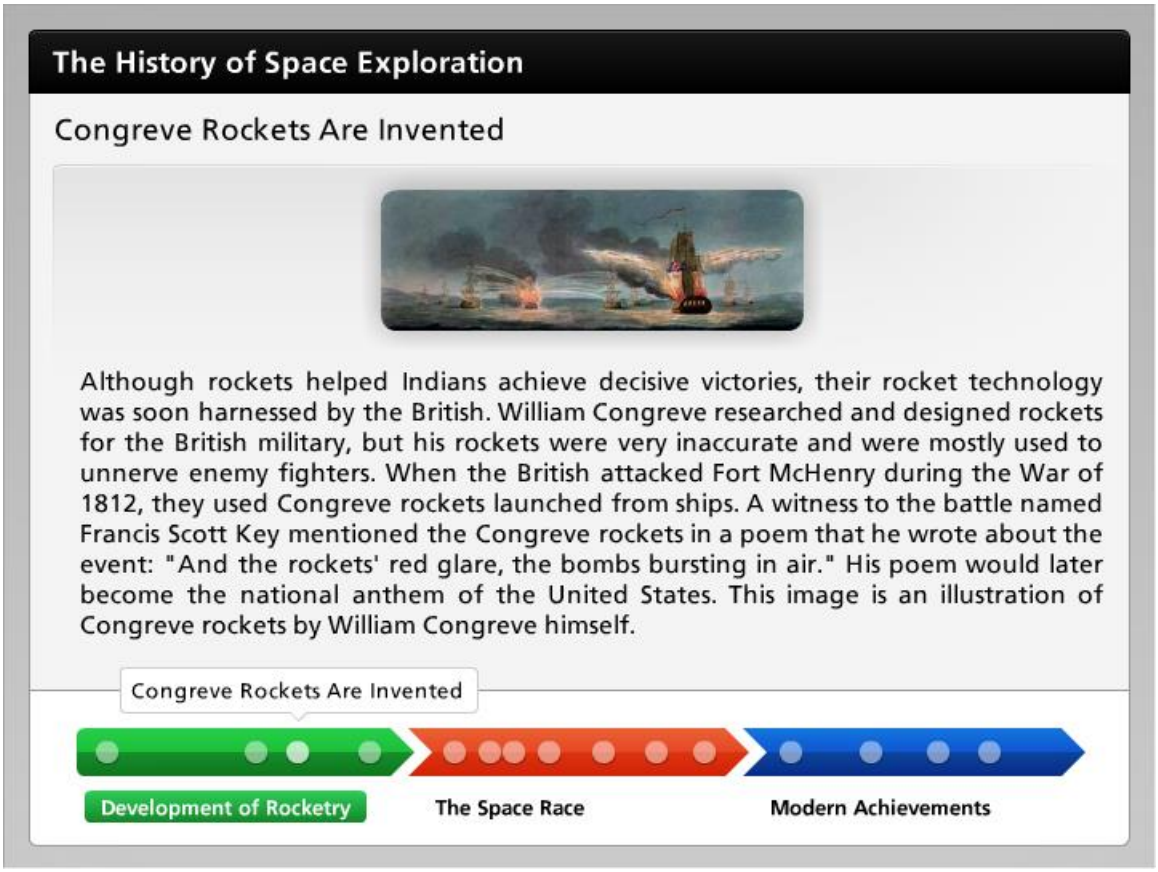
Iron-Clad Rockets Are Developed



In 1792, the first iron-clad rocket was used in India during the Anglo-Mysore Wars against Britain. These Mysorean rockets usually consisted of an iron tube that was closed at one end and strapped to a shaft of bamboo about four feet long. The iron tube acted as a combustion chamber and could propel a rocket almost one thousand yards, much farther than European rockets.

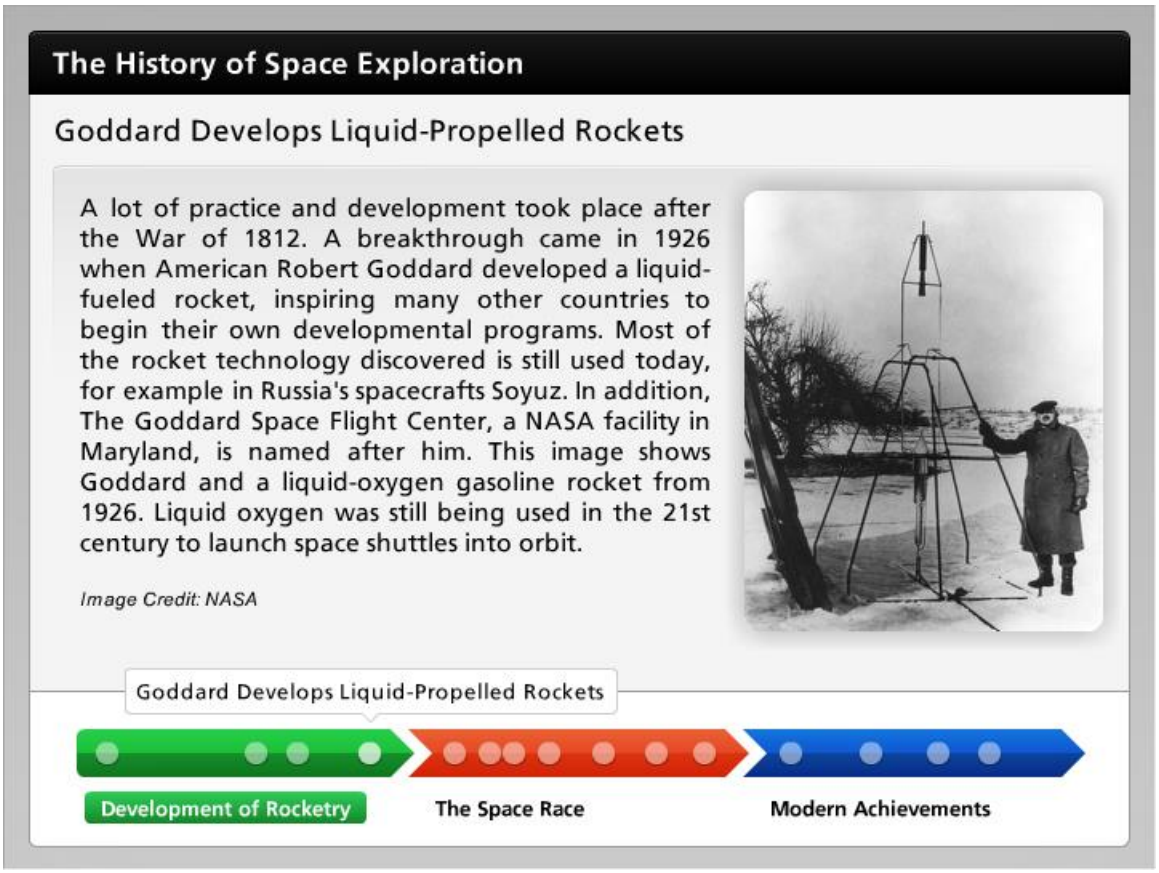
In the image pictured here, an Indian soldier carries a flag draped over a rocket.

Congreve Rockets Are Invented



Although rockets helped Indians achieve decisive victories, their rocket technology was soon harnessed by the British. William Congreve researched and designed rockets for the British military, but his rockets were very inaccurate and were mostly used to unnerve enemy fighters. When the British attacked Fort McHenry during the War of 1812, they used Congreve rockets launched from ships. A witness to the battle named Francis Scott Key mentioned the Congreve rockets in a poem that he wrote about the event: "And the rockets' red glare, the bombs bursting in air." His poem would later become the national anthem of the United States. This image is an illustration of Congreve rockets by William Congreve himself.

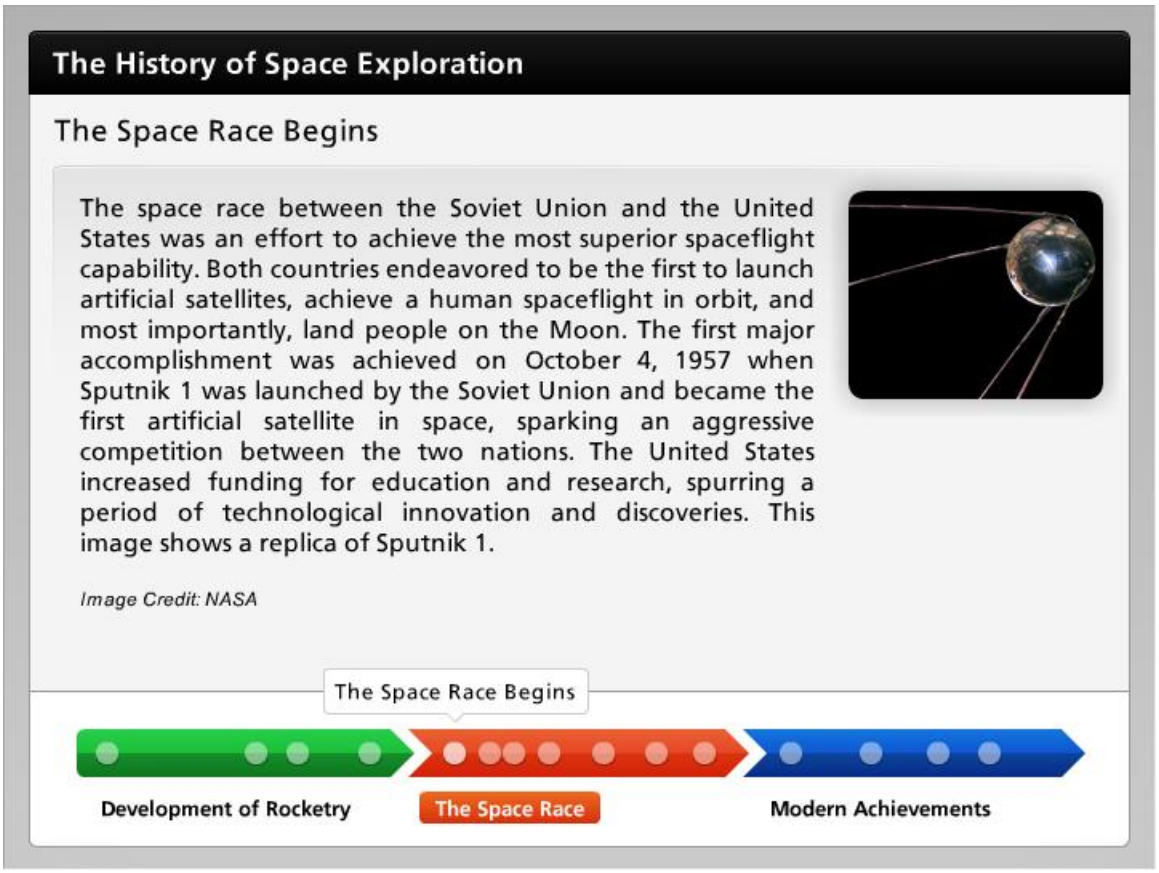
Goddard Develops Liquid-Propelled Rockets



A lot of practice and development took place after the War of 1812. A breakthrough came in 1926 when American Robert Goddard developed a liquid-fueled rocket, inspiring many other countries to begin their own developmental programs. Most of the rocket technology discovered is still used today, for example in Russia's spacecrafts Soyuz. In addition, The Goddard Space Flight Center, a NASA facility in Maryland, is named after him. This image shows Goddard and a liquid-oxygen gasoline rocket from 1926. Liquid oxygen was still being used in the 21st century to launch space shuttles into orbit.

Image Credit: NASA

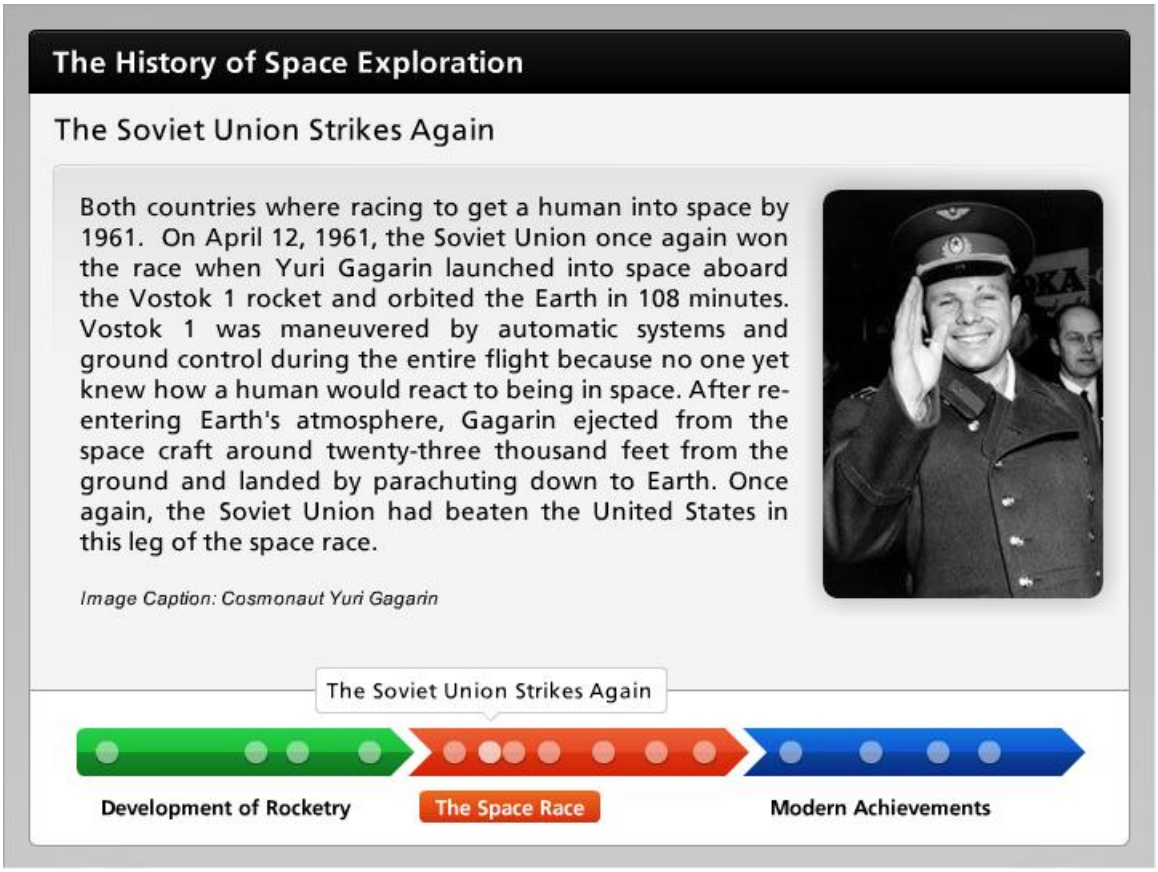
The Space Race Begins



The space race between the Soviet Union and the United States was an effort to achieve the most superior spaceflight capability. Both countries endeavored to be the first to launch artificial satellites, achieve a human spaceflight in orbit, and most importantly, land people on the Moon. The first major accomplishment was achieved on October 4, 1957 when Sputnik 1 was launched by the Soviet Union and became the first artificial satellite in space, sparking an aggressive competition between the two nations. The United States increased funding for education and research, spurring a period of technological innovation and discoveries. This image shows a replica of Sputnik 1.

Image Credit: NASA

The Soviet Union Strikes Again



Both countries where racing to get a human into space by 1961. On April 12, 1961, the Soviet Union once again won the race when Yuri Gagarin launched into space aboard the Vostok 1 rocket and orbited the Earth in 108 minutes. Vostok 1 was maneuvered by automatic systems and ground control during the entire flight because no one yet knew how a human would react to being in space. After re-entering Earth's atmosphere, Gagarin ejected from the space craft around twenty-three thousand feet from the ground and landed by parachuting down to Earth. Once again, the Soviet Union had beaten the United States in this leg of the space race.

Image Caption: Cosmonaut Yuri Gagarin

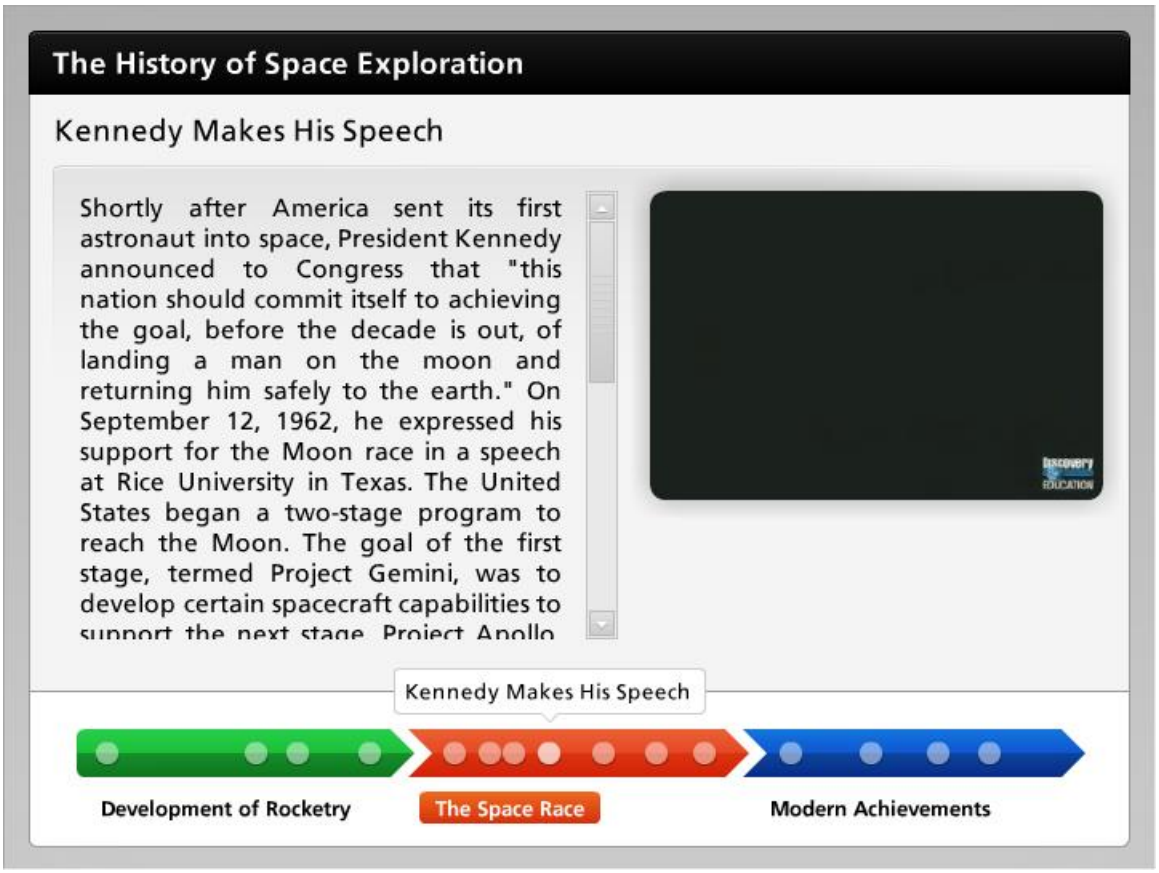
The United States Responds

Three weeks later on May 5, 1961, Alan Shepard became the first American in space. Though he did not orbit Earth, he did take manual control over his spaceship Mercury-Redstone 3 as part of Project Mercury. Also working under the space program Project Mercury, astronaut John Glenn became the first American to orbit Earth on February 20, 1962.

In the image shown, Shepard (left) and Glenn (right) are preparing for the respective missions.

Image Credit: NASA

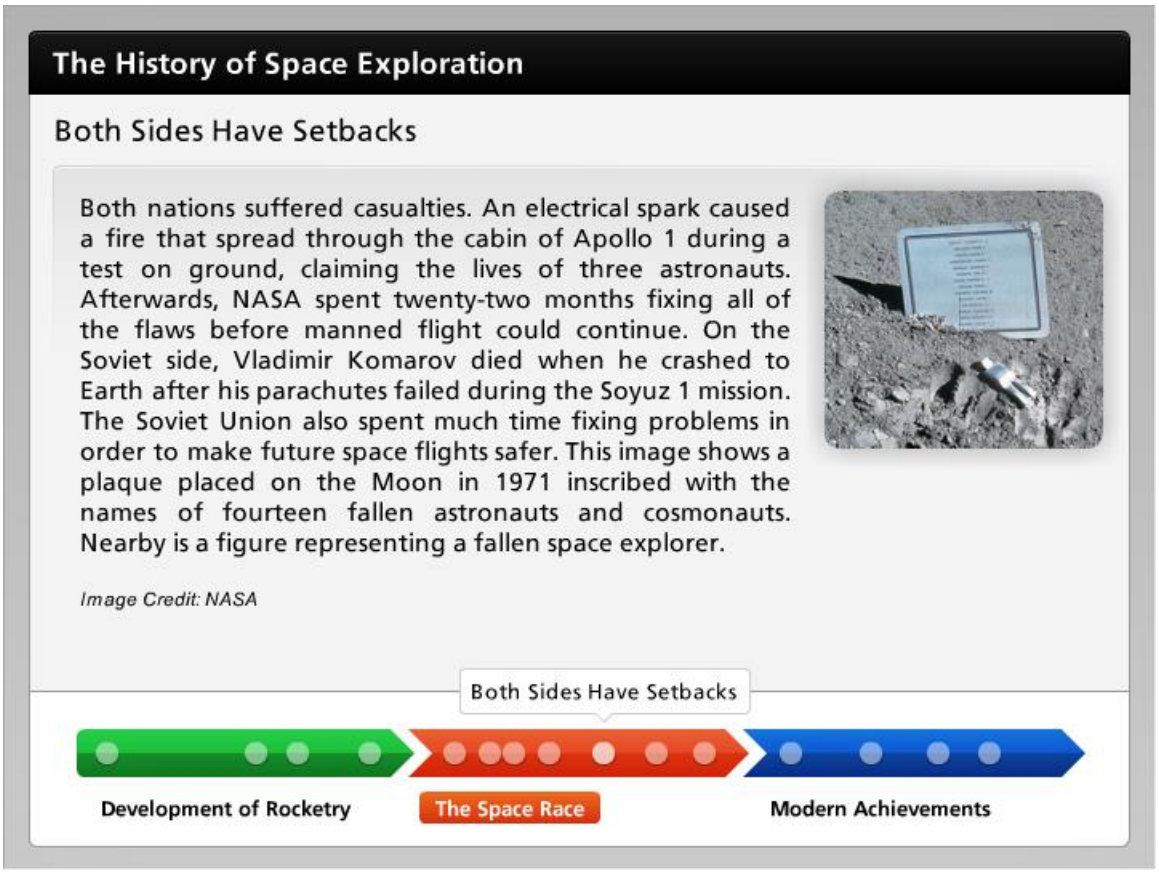
Kennedy Makes His Speech



Shortly after America sent its first astronaut into space, President Kennedy announced to Congress that "this nation should commit itself to achieving the goal, before the decade is out, of landing a man on the moon and returning him safely to the earth." On September 12, 1962, he expressed his support for the Moon race in a speech at Rice University in Texas. The United States began a two-stage program to reach the Moon. The goal of the first stage, termed Project Gemini, was to develop certain spacecraft capabilities to support the next stage, Project Apollo. During Gemini 3, astronauts successfully changed orbit during flight for the first time. The Gemini 5 mission undertook a space flight long enough to sustain a trip to the Moon. Gemini 8 allowed for the first docking between two spacecrafts. And lastly, Edwin "Buzz" Aldrin spent five hours on a spacewalk during Gemini 12, proving that astronauts could work productively in space outside of the spacecraft.

In this video, you can view Kennedy's famous "We choose to go to the Moon" speech at Rice University that inspired the entire nation to pool together the resources and effort necessary to land a man on the Moon.

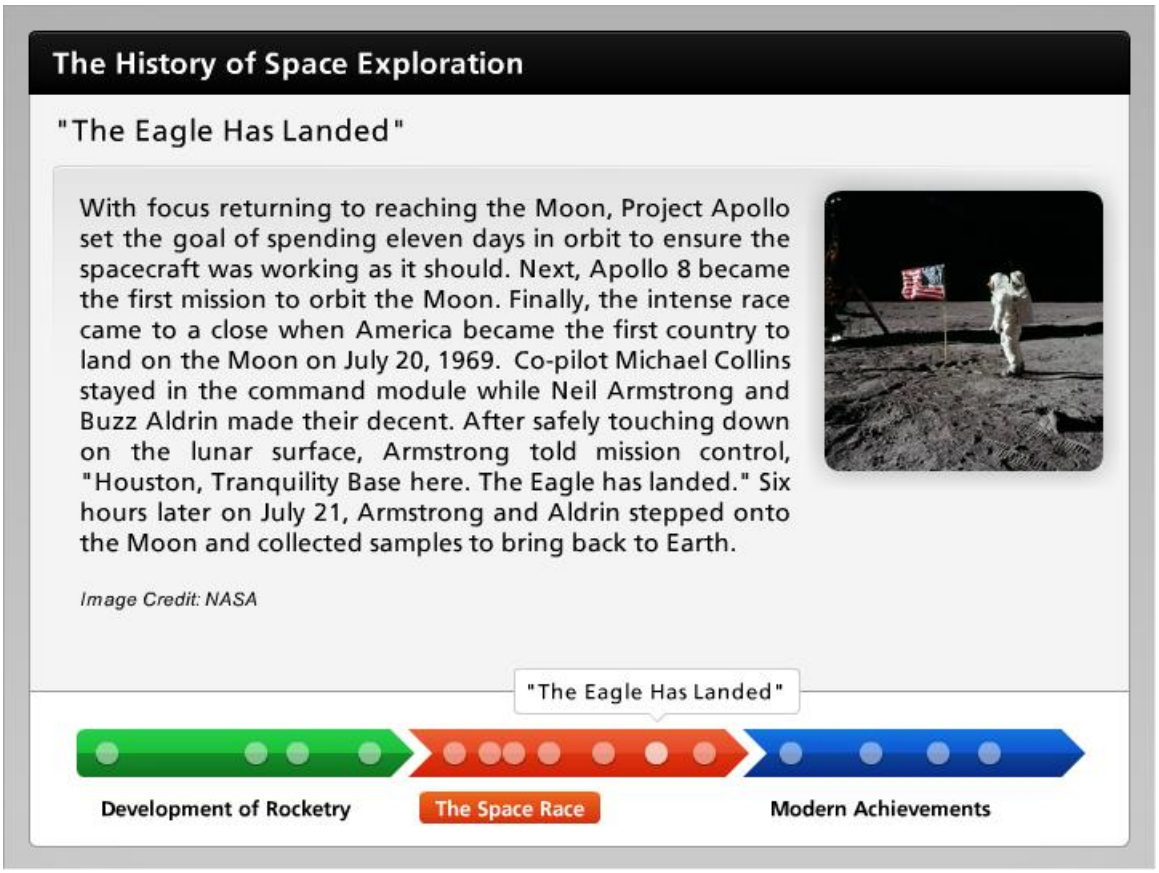
Both Sides Have Setbacks



Both nations suffered casualties. An electrical spark caused a fire that spread through the cabin of Apollo 1 during a test on ground, claiming the lives of three astronauts. Afterwards, NASA spent twenty-two months fixing all of the flaws before manned flight could continue. On the Soviet side, Vladimir Komarov died when he crashed to Earth after his parachutes failed during the Soyuz 1 mission. The Soviet Union also spent much time fixing problems in order to make future space flights safer. This image shows a plaque placed on the Moon in 1971 inscribed with the names of fourteen fallen astronauts and cosmonauts. Nearby is a figure representing a fallen space explorer.

Image Credit: NASA

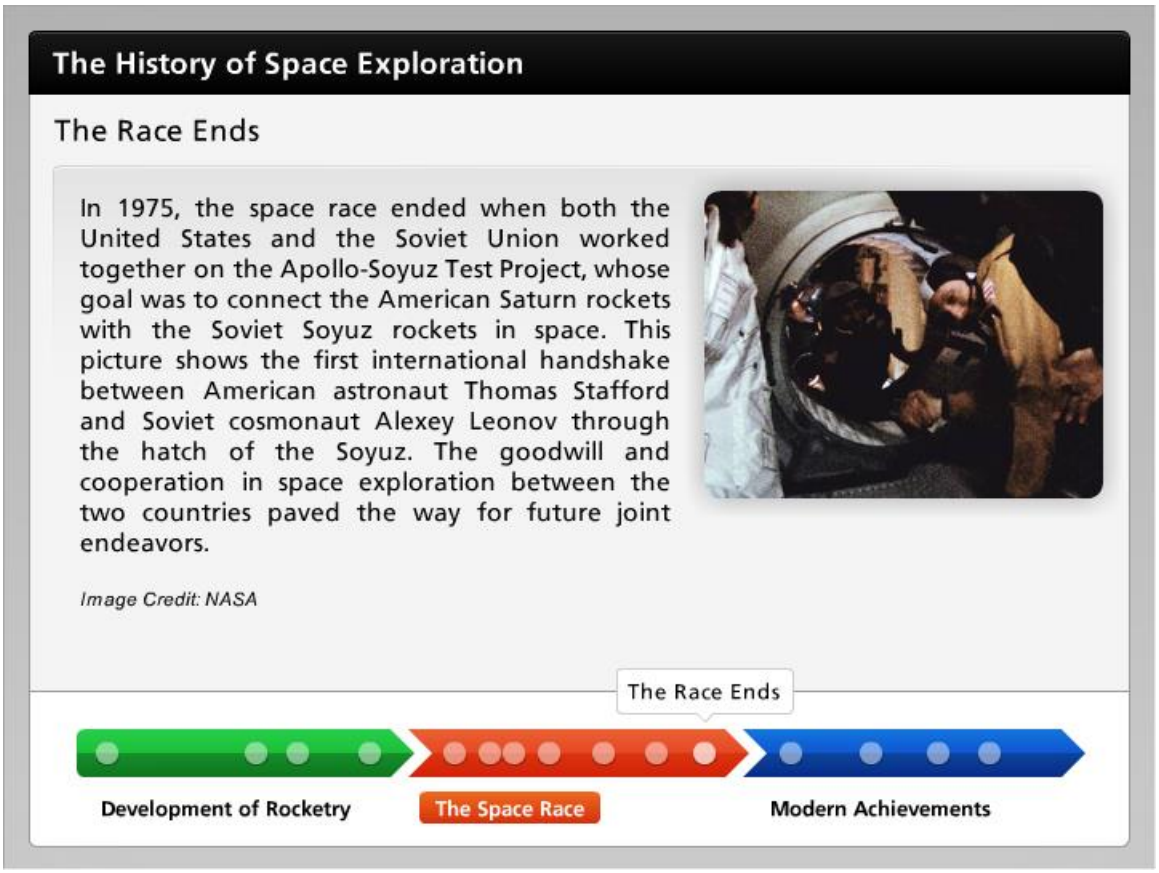
"The Eagle Has Landed"



With focus returning to reaching the Moon, Project Apollo set the goal of spending eleven days in orbit to ensure the spacecraft was working as it should. Next, Apollo 8 became the first mission to orbit the Moon. Finally, the intense race came to a close when America became the first country to land on the Moon on July 20, 1969. Co-pilot Michael Collins stayed in the command module while Neil Armstrong and Buzz Aldrin made their decent. After safely touching down on the lunar surface, Armstrong told mission control, "Houston, Tranquility Base here. The Eagle has landed." Six hours later on July 21, Armstrong and Aldrin stepped onto the Moon and collected samples to bring back to Earth.

Image Credit: NASA

The Race Ends



In 1975, the space race ended when both the United States and the Soviet Union worked together on the Apollo-Soyuz Test Project, whose goal was to connect the American Saturn rockets with the Soviet Soyuz rockets in space. This picture shows the first international handshake between American astronaut Thomas Stafford and Soviet cosmonaut Alexey Leonov through the hatch of the Soyuz. The goodwill and cooperation in space exploration between the two countries paved the way for future joint endeavors.

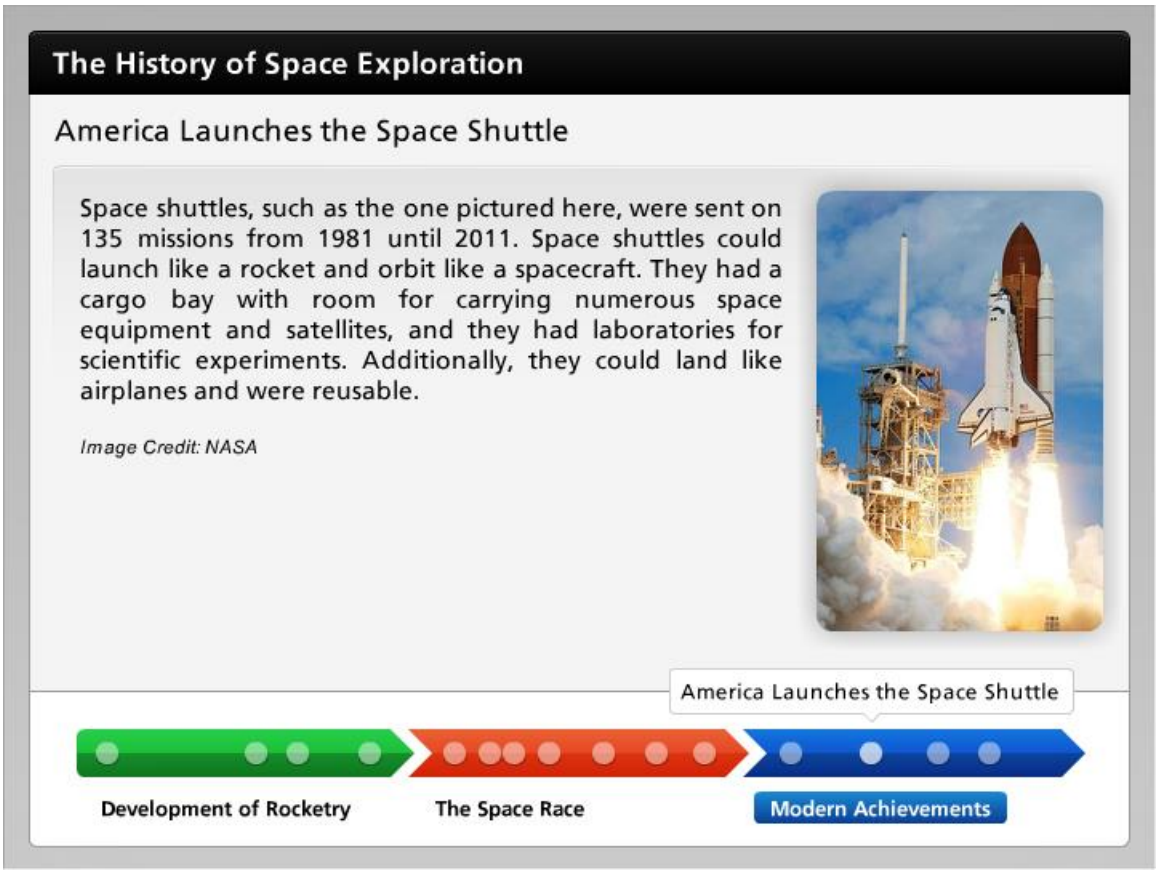
Image Credit: NASA

A Space Lab Is Built

Skylab was launched in 1973 by a United States Saturn rocket. This space station contained a laboratory to conduct numerous scientific investigations. Skylab disintegrated in 1979 as it re-entered the Earth's atmosphere. Skylab is pictured here orbiting Earth in 1974.

Image Credit: NASA

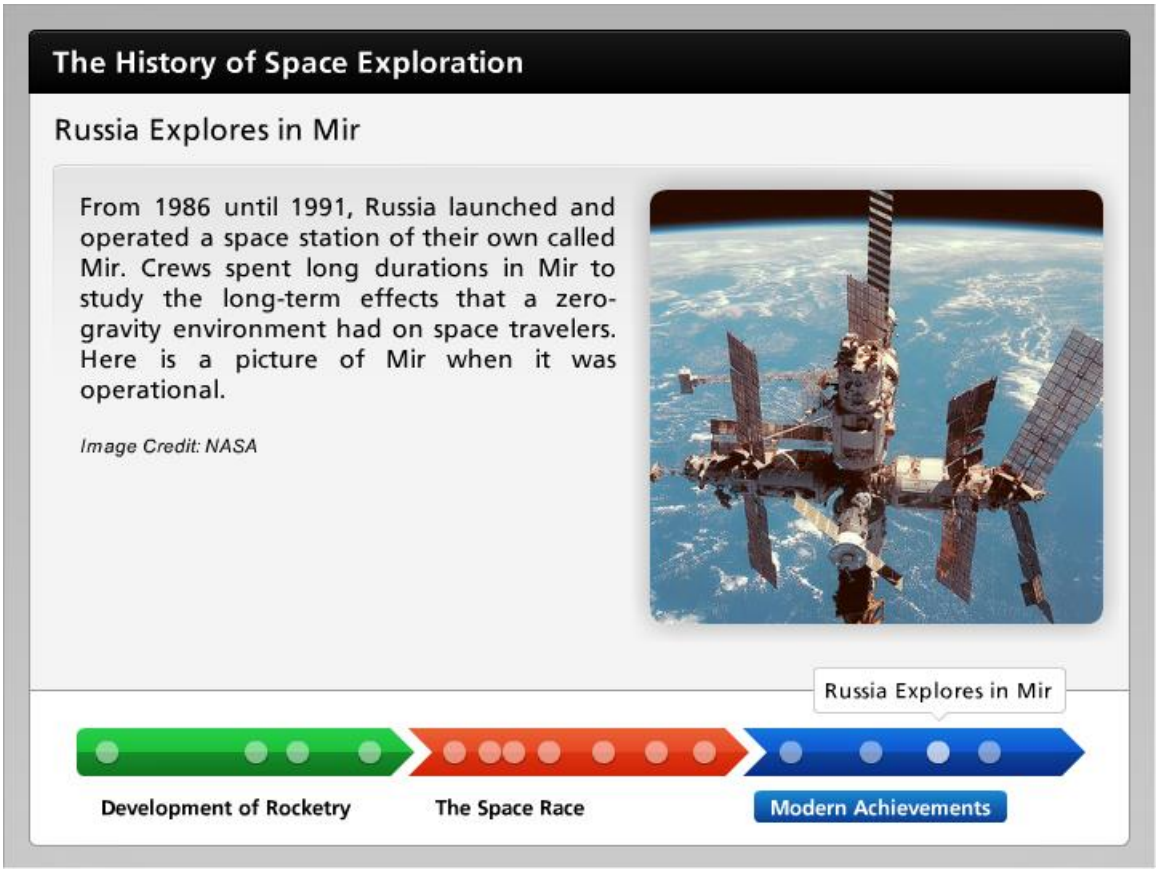
America Launches the Space Shuttle



Space shuttles, such as the one pictured here, were sent on 135 missions from 1981 until 2011. Space shuttles could launch like a rocket and orbit like a spacecraft. They had a cargo bay with room for carrying numerous space equipment and satellites, and they had laboratories for scientific experiments. Additionally, they could land like airplanes and were reusable.

Image Credit: NASA

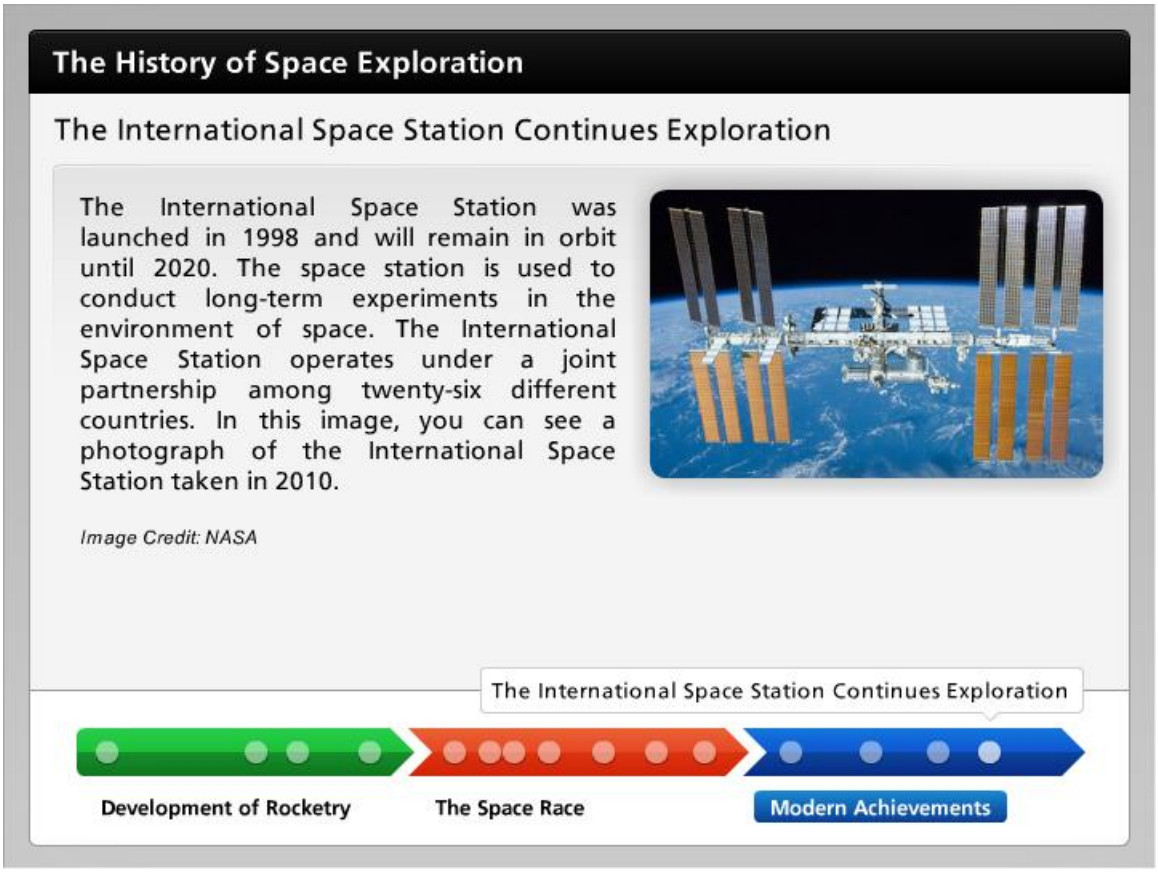
Russia Explores in Mir



From 1986 until 1991, Russia launched and operated a space station of their own called Mir. Crews spent long durations in Mir to study the long-term effects that a zero-gravity environment had on space travelers. Here is a picture of Mir when it was operational.

Image Credit: NASA

The International Space Station Continues Exploration



The International Space Station was launched in 1998 and will remain in orbit until 2020. The space station is used to conduct long-term experiments in the environment of space. The International Space Station operates under a joint partnership among twenty-six different countries. In this image, you can see a photograph of the International Space Station taken in 2010.

Image Credit: NASA