

A history of rockets

By NASA.gov, adapted by Newsela staff on 11.17.16

Word Count **993**

Level **1060L**



TOP: A space shuttle blasts off piggybacking on a rocket. Pixabay. Graphics courtesy of NASA.

Today's rockets are the result of thousands of years of experimentation and research.

One of the first devices to successfully employ the principles of rocket flight was invented around the year 400 B.C. The Greek philosopher Archytas mystified and amused his fellow citizens by flying a pigeon made of wood. The bird was suspended on wires and propelled by hot steam.

The earliest true rockets may have emerged by accident. In the first century A.D., the Chinese reportedly had a simple form of gunpowder. To create explosions during religious festivals, they filled bamboo tubes with the mixture and tossed them into fires. Eventually, they discovered that these gunpowder tubes could launch themselves just by the power produced from the escaping gas.

"Arrows Of Flying Fire"

The first reported use of true rockets was in 1232 during a war between the Chinese and the Mongols. In the battle of Kai-Keng, the Chinese repelled the Mongol invaders by a barrage of "arrows of flying fire." These fire-arrows were a simple form of a solid-propellant rocket. A tube,

capped at one end, contained gunpowder. The other end was left open. When the powder was ignited, it burned rapidly, producing fire, smoke and gas, which escaped out the open end - pushing the rocket forward. It is not clear how effective these early rockets were as weapons, but they must have shocked and frightened the Mongols.

Following the battle, the Mongols produced rockets of their own and may have been responsible for the spread of rockets to Europe.

By the 16th century, rockets were no longer used as weapons in war. They were, however, still used for fireworks displays. Johann Schmidlap, a German fireworks maker, invented the step rocket, a multi-staged vehicle for lifting fireworks to higher altitudes. A large sky rocket (first stage) carried a smaller sky rocket (second stage). When the large rocket burned out, the smaller one continued to a higher altitude before showering the sky with glowing cinders. Schmidlap's idea is basic to all rockets today that go into outer space.

During the latter part of the 17th century, the great English scientist Sir Isaac Newton laid the scientific foundations for modern rocketry. Newton organized his understanding of physical motion into three scientific laws. The laws explain how rockets work and why they are able to work in the vacuum of outer space.

During the end of the 18th century and early into the 19th, rockets experienced a brief revival as a weapon of war. An artillery expert, Colonel William Congreve, set out to design rockets for use by the British military. His rockets were highly successful in battle, and inspired Francis Scott Key to write the phrase "the rockets' red glare" in a poem, which later became "The Star-Spangled Banner."

Scientists Develop New Methods

The accuracy of rockets still had not improved much from the early days, though. During a typical siege, thousands of them had to be fired at the enemy. To address this issue, an Englishman, William Hale, developed a method called spin stabilization. The escaping exhaust gases were channeled into small blades at the bottom of the rocket, causing it to spin. The same principle is still used today.

In 1898, a Russian schoolteacher, Konstantin Tsiolkovsky, proposed the idea of space exploration by rocket. In a report he published in 1903, Tsiolkovsky suggested the use of liquid propellants, or fuel, to achieve greater distance.

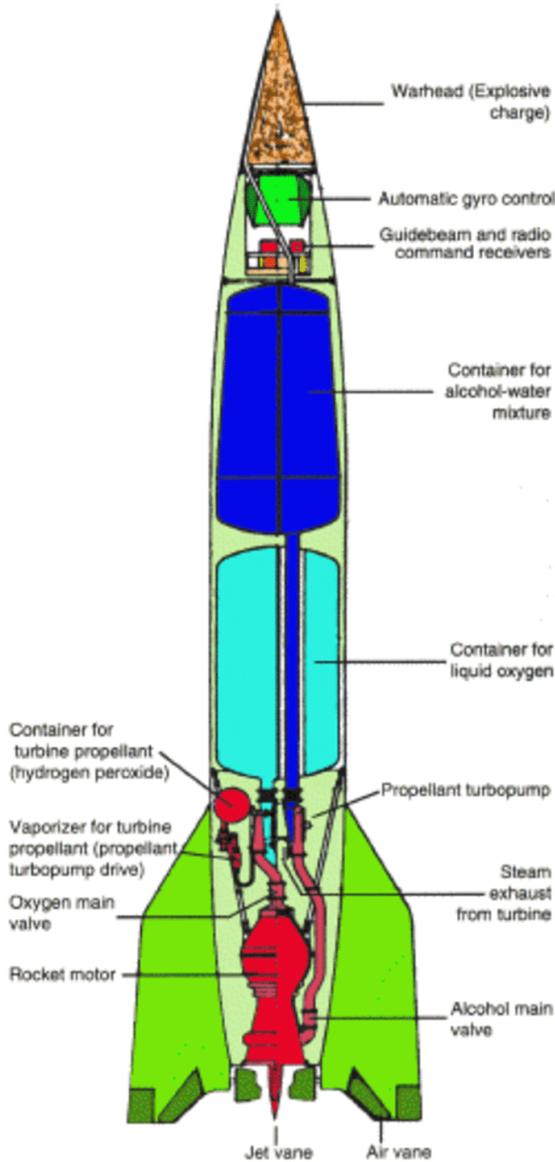
The first successful flight with a liquid-propellant rocket was achieved by an American, Robert H. Goddard, in 1926. Fueled by liquid oxygen and gasoline, Goddard's rocket flew for only two-and-a-half seconds, climbed 12.5 meters, and landed 56 meters away in a cabbage patch. By today's standards, the flight was unimpressive. Still, Goddard's gasoline rocket started a new era in rocket flight.

Goddard's experiments continued for many years. He developed a parachute system to return rockets and instruments safely after flight. For his achievements, Goddard has been called the father of modern rocketry.

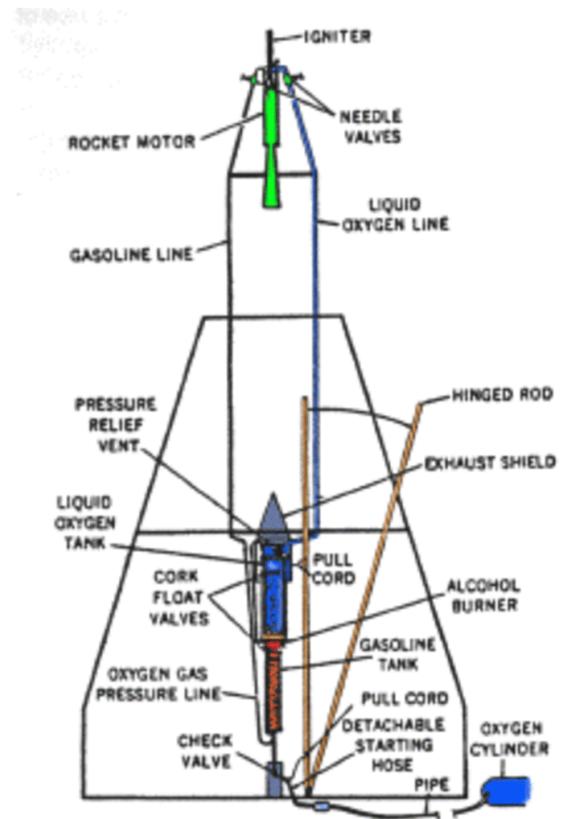
V-2 Rocket Used As Weapon

A third great space pioneer, Hermann Oberth, published a book in 1923 about rocket travel into outer space. Because of his writings, many small rocket societies sprang up around the world. In Germany, one society was the Verein für Raumschiffahrt, or Society for Space Travel. The formation of this group led to the development of the V-2 rocket, a weapon used against London in World War II.

The V-2 rocket was small, but it could destroy entire city blocks.



German V-2 (A-4) Missile



Dr. Goddard's 1926 Rocket

Fortunately for London and the Allied forces, the V-2 came too late in the war to change its outcome.

With the fall of Germany, many German rocket scientists relocated to the United States or to the Soviet Union. What followed was an intense period of research and competition between the two powers.

On October 4, 1957, the world was stunned by the news of Sputnik I, an Earth-orbiting artificial satellite rocket-launched by the Soviet Union. Less than a month later, the Soviets followed with the launch of a satellite carrying a dog named Laika. Laika survived in space for seven days.

U.S. Creates Space Agency

A few months after the first Sputnik, the U.S. launched a satellite of its own. Explorer I was launched by the U.S. Army on January 31, 1958. That year, the United States formally organized its space program by creating the National Aeronautics and Space Administration (NASA).

Soon, many people and spacecraft were being launched into space by rocket. Astronauts orbited Earth and landed on the moon. Space was suddenly opened up to exploration. Satellites enabled scientists to investigate our world, forecast the weather and communicate instantaneously around the globe. A wide variety of powerful rockets had to be built to help launch these machines into space.

Since the earliest days of discovery, rockets have evolved from simple gunpowder devices into giant vehicles capable of traveling into outer space. They have opened the universe to direct exploration by humankind.

Quiz

- 1 Which of the following sentences from the article BEST develops the idea that rockets have had positive impacts on society?
- (A) To create explosions during religious festivals, they filled bamboo tubes with the mixture and tossed them into fires.
 - (B) During the latter part of the 17th century, the great English scientist Sir Isaac Newton laid the scientific foundations for modern rocketry.
 - (C) With the fall of Germany, many German rocket scientists relocated to the United States or to the Soviet Union.
 - (D) Satellites enabled scientists to investigate our world, forecast the weather and communicate instantaneously around the globe.
- 2 What purpose does the introduction [paragraphs 1-3] serve in developing the main idea of the article?
- (A) It gives a summary of the importance of rockets.
 - (B) It provides information about the oldest known rockets.
 - (C) It describes a problem that rockets have solved.
 - (D) It gives an overview of how rockets have improved.
- 3 How do the diagrams relate to the main idea of the article?
- (A) They show the reader how to build a simple rocket.
 - (B) They show how rockets were able to launch into space.
 - (C) They show how the design of rockets changed.
 - (D) They show the different ways people can use rockets.
- 4 Which sentence from the article is BEST supported by the bottom diagram?
- (A) The escaping exhaust gases were channeled into small blades at the bottom of the rocket, causing it to spin.
 - (B) In Germany, one society was the Verein fur Raumschiffahrt, or Society for Space Travel.
 - (C) The V-2 rocket was small, but it could destroy entire city blocks.
 - (D) Fortunately for London and the Allied forces, the V-2 came too late in the war to change its outcome.