Blast Off!

Introduction

Why do you think we needed rockets?

Let’s dive into the history of rockets…

The Fire Dragon

Medieval and early modern rockets were used militarily as incendiary weapons in sieges.

The first gunpowder-powered rockets evolved in medieval China under the Song dynasty by the 13th century.

There are mentions of the first known multistage rocket, the ‘fire-dragon issuing from the water’, thought to have been used by the Chinese navy.

DID YOU KNOW?

The Mysorean rockets were the first successful iron-cased rockets, developed in the late 18th century in the Kingdom of Mysore under the rule of Hyder Ali, who then used them to defeat an East India Company battalion during the Battle of Guntur.

“Every vision is a joke until the first man accomplishes it; once realized, it becomes commonplace.”

— Robert H. Goddard

- William Leitch first proposed the concept of using rockets to enable human spaceflight in 1861.
- In 1898, Tsiolkovsky proposed the idea of liquid propelled rockets. He is called the father of the modern astronautics
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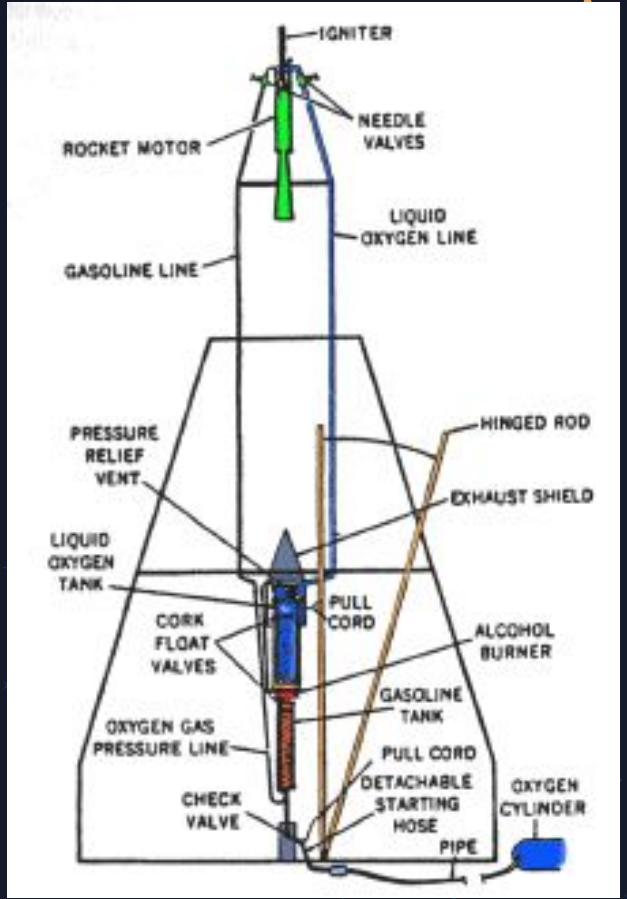
- Early in the 20th century, an American, Robert H. Goddard, conducted practical experiments in rocketry.
- While working on solid-propellant rockets, Goddard became convinced that a rocket could be propelled better by liquid fuel.
- He achieved the first successful flight on March 1926, with oxygen and gasoline as fuel.



- Gasoline was used as a fuel and oxygen was used as an oxidiser.
- But Hol' Up!! Pure Oxygen + Gasoline + ignition = 

- He figured out a way to keep the combustion chamber from exploding by making a revolutionary modification, which is still used in modern rocketry!!
- He used extremely cold liquid oxygen via a network of pipes to keep the combustion chamber cool and making rocket more efficient since less energy is lost as heat.

- The rocket's combustion chamber is the small cylinder at the top, the nozzle is visible beneath it.
- The fuel tank is directly beneath the nozzle and is protected from the motor's exhaust by an asbestos cone.
- Asbestos-wrapped aluminum tubes connect the motor to the tanks, providing both support and fuel transport.
- Asbestos is a natural fiber which provided thermal insulation but is very dangerous.
- But this design was not stable and the combustion chamber and the nozzle was later put at the bottom.

Why do you think this design failed?

Ps: Go do some research...

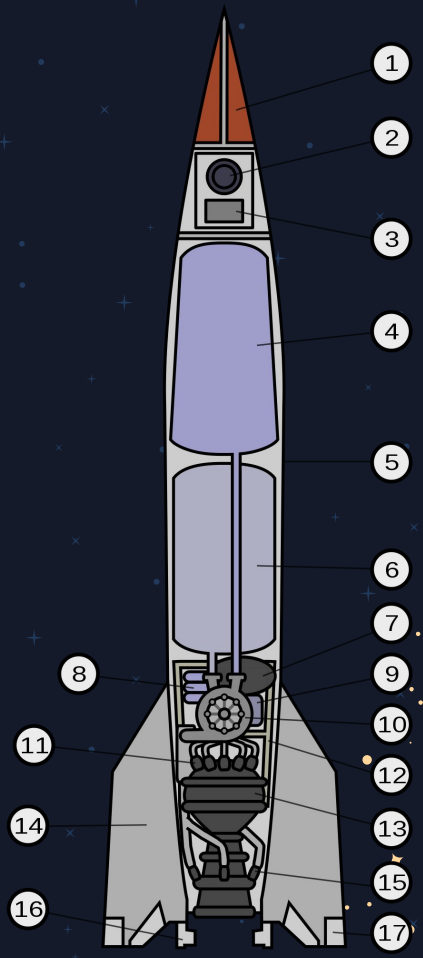
“One good test is worth a thousand expert opinions”

-Wernher von Braun

Going beyond the Skies

- He was the pioneer of the famous V-2 rocket.
- The V-2 became the first artificial object to travel into space by crossing the Karman line on 20th June 1944.
- It used 75% Ethanol/ 25% water(as coolant) mixture for fuel and liquid oxygen as an oxidiser.
- The pump was driven by a steam engine which carried fuel and oxygen to the combustion chamber.
- Sodium permanganate was used as a catalyst to make steam from hydrogen peroxide.

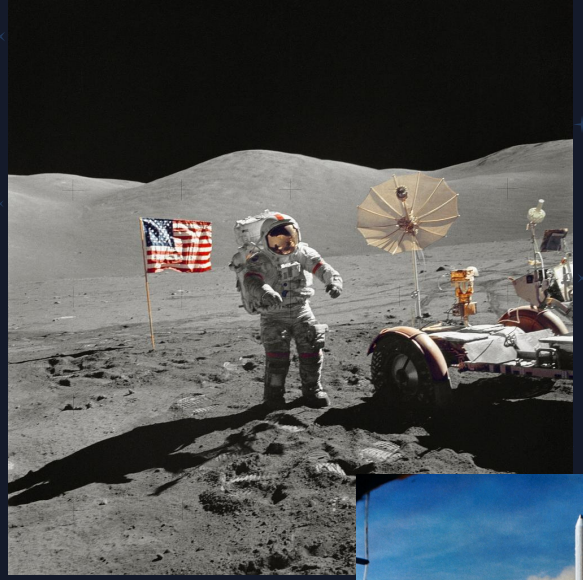
Try and figure out the different parts of the rocket.



The Space Race

- The Space Race began with the 1957 launch of the Soviet satellite Sputnik 1.
- **Vostok** was a family of rockets derived from the Soviet R-7 Semyorka ICBM and was designed for the human spaceflight programme. This family of rockets launched the first artificial satellite (Sputnik 1) and the first crewed spacecraft (Vostok) in human history.
- The Soviet Union put the first human, cosmonaut Yuri Gagarin, into a single orbit aboard Vostok 1 on April 12, 1961.

- With the space race heating up, the US also launched programmes like Project Mercury and Project Gemini, but they were a little behind in the race to space.
- But everything changed with **The Apollo Program.**
- It was the third human spaceflight program which succeeded in landing the first humans on moon from 1969-1972.
- Several planned missions of the Apollo crewed Moon landing program of the 1960s and 1970s were canceled for a variety of reasons, including changes in technical direction, the Apollo 1 fire, hardware delays, and budget limitations.
- It is highly recommended to watch Apollo 11 documentary!



Fast Forward to Today

The future of space travel

SpaceX

- After a long long hibernation, finally the world is waking up to space exploration again. And this time it's not any cold war fueling the ignition, it's a burning desire to level up humanity as a whole.
- **Space Exploration Technologies Corp.** popularly known as **SpaceX** is an American space manufacturer, founded in 2002 by Elon Musk with the goal of reducing space transportation costs to enable the colonization of Mars and make humanity a space faring civilization.
- SpaceX manufactures the Falcon 9 and Falcon Heavy launch vehicles, several rocket engines, Cargo Dragon, crew spacecraft, and Starlink communications satellites

- SpaceX is the first organisation to produce reusable rockets and boosters!!
- Currently they are working on **Starship,** a fully reusable super heavy-lift launch vehicle. It is the tallest, heaviest, and most powerful rocket ever built. Both stages combust liquid oxygen and methane with variants of Raptor engines.
- Starship may deploy satellites and space probes, serving space tourists, and exploring the Moon via the Artemis program. Further into the future, the rocket may travel between locations on Earth and aid SpaceX's ambition of colonizing Mars. Such operation level is only possible due to reduced launch cost.