

# What Is a Rocket?



The word "rocket" can mean different things. Most people think of a tall, thin, round vehicle. They think of a rocket that launches into space. "Rocket" can mean a type of engine. The word also can mean a vehicle that uses that engine.





There are 3 basic parts to a rocket:

- the structural and mechanical parts (engines, storage spaces, tanks, fins)
- fuel (can be various materials such as liquid oxygen, gasoline or liquid hydrogen)
- **payload** – what is being transported by the rocket (people, food, water, air, cargo)
- what are possible payloads (what types of things are being transported by rockets)



# How Does a Rocket Engine Work?



Like most engines, rockets burn fuel. Most rocket engines turn the fuel into hot gas. The engine pushes the gas out its back. The gas makes the rocket move forward.

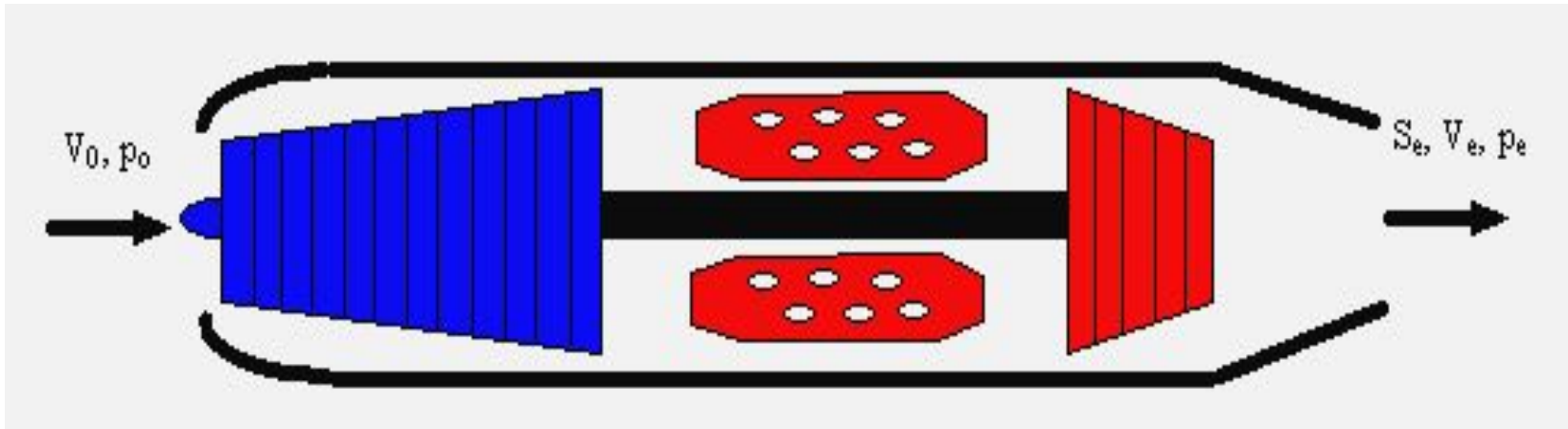
A rocket is different from a jet engine. A jet engine needs air to work. A rocket engine doesn't need air. It carries with it everything it needs. A rocket engine works in space, where there is no air.

# Airbreathing Engine

**Inlet**

**Combustor**

**Nozzle**



**Compressor**

**Turbine**

**Accessories: Afterburner, Thrust Reverser, Spoiler..**



# Why Does a Rocket Work?

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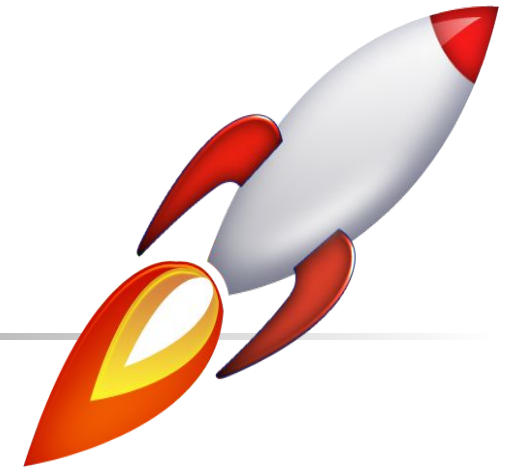
In space, an engine has nothing to push against. So how do rockets move there? Rockets work by a scientific rule called Newton's third law of motion. English scientist Sir Isaac Newton listed three Laws of Motion. He did this more than 300 years ago. His third law says that for every action, there is an equal and opposite reaction. The rocket pushes on its exhaust. The exhaust pushes the rocket, too. The rocket pushes the exhaust backward. The exhaust makes the rocket move forward.

# Propellant



Rocket propellant is mass that is stored, usually in some form of propellant tank or casing, prior to being used as the propulsive mass that is ejected from a rocket engine in the form of a fluid jet to produce thrust. For chemical rockets often the propellants are a fuel such as liquid hydrogen or kerosene burned with an oxidizer such as liquid oxygen or nitric acid to produce large volumes of very hot gas.

# Design



A rocket design can be as simple as a cardboard tube filled with black powder, but to make an efficient, accurate rocket or missile involves overcoming a number of difficult problems. The main difficulties include cooling the combustion chamber, pumping the fuel (in the case of a liquid fuel), and controlling and correcting the direction of motion

# Types



There are actually many different types of rockets including:

- tiny models such as balloon rockets, water rockets, skyrockets or small solid rockets that can be purchased at a hobby store
- missiles
- space rockets such as the enormous Saturn V used for the Apollo program
- rocket cars
- rocket bike
- rocket-powered aircraft
- rocket sleds
- rocket trains
- rocket torpedos
- rocket-powered jet packs
- space probes



# Uses



Rockets or other similar reaction devices carrying their own propellant must be used when there is no other substance (land, water, or air) or force (gravity, magnetism, light) that a vehicle may usefully employ for propulsion, such as in space. In these circumstances, it is necessary to carry all the propellant to be used.

# Rockets in the Future



New rockets are being developed today. They will launch astronauts on future missions. The new rockets will not look like the space shuttle. These rockets will look more like earlier ones. They will be tall and round and thin. These rockets will take astronauts into space. They will take supplies to the International Space Station.

