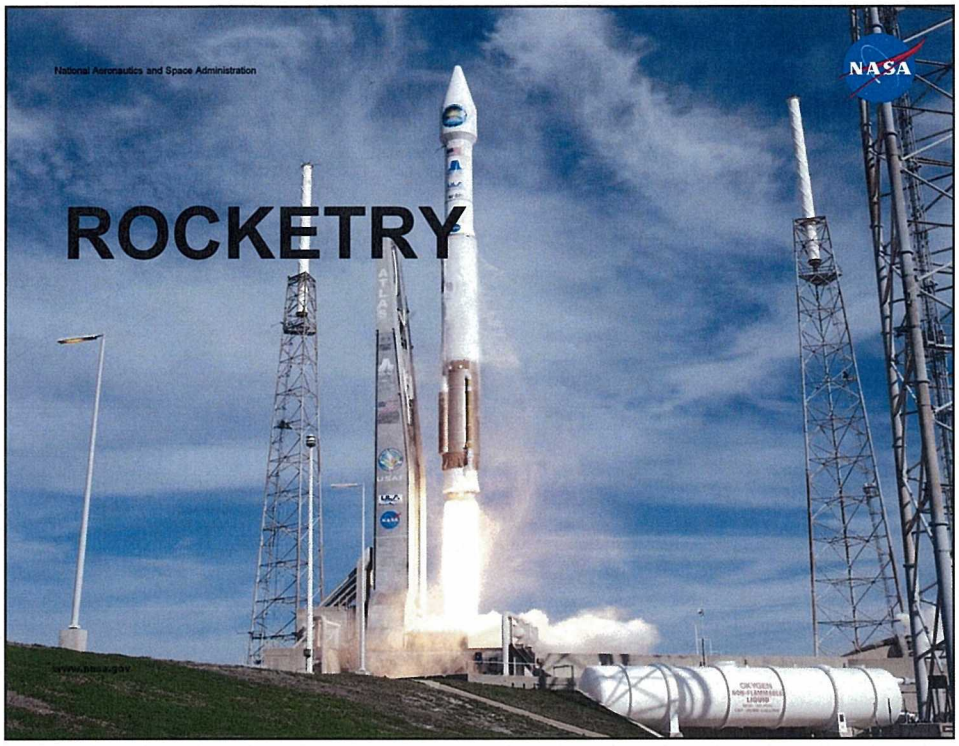


The most important thing is to familiarize yourself with what you're working with. Don't stress about knowing all the details but know what to expect when you talk about the slides and the activity. Time management is probably the most important thing. Don't rush through the presentation but make sure you leave enough time for students to really have fun with the activity. Don't expect too many in depth questions from younger students.

It's important to be able to communicate what you do for NASA. You need to either go ahead and address your profession or just be prepared because someone will ask.

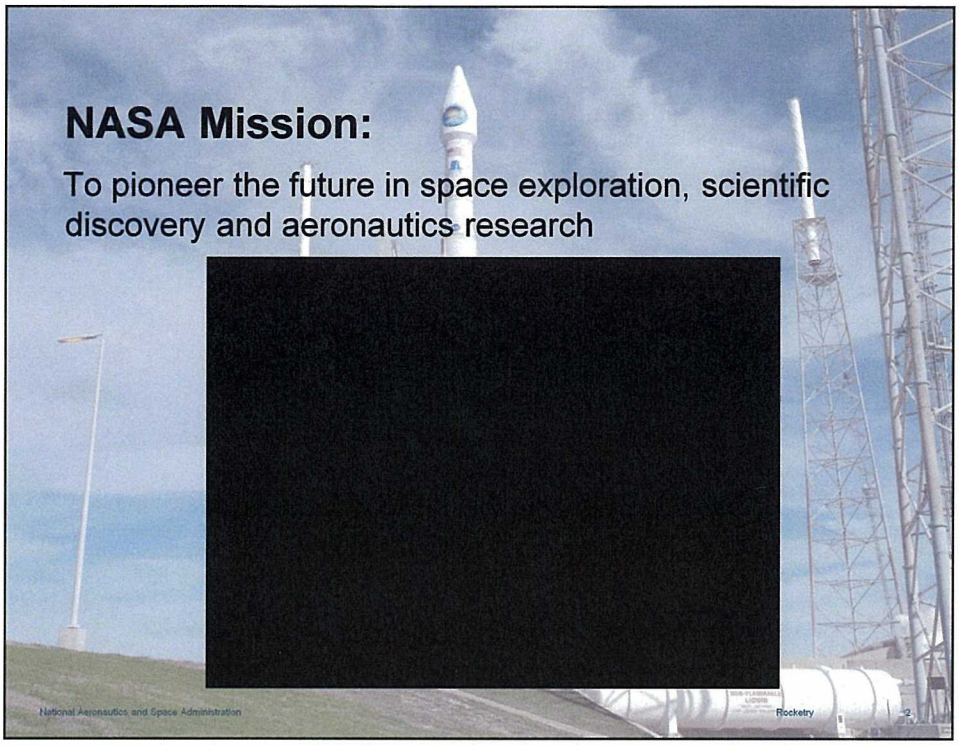
Breathe.

Be yourself.

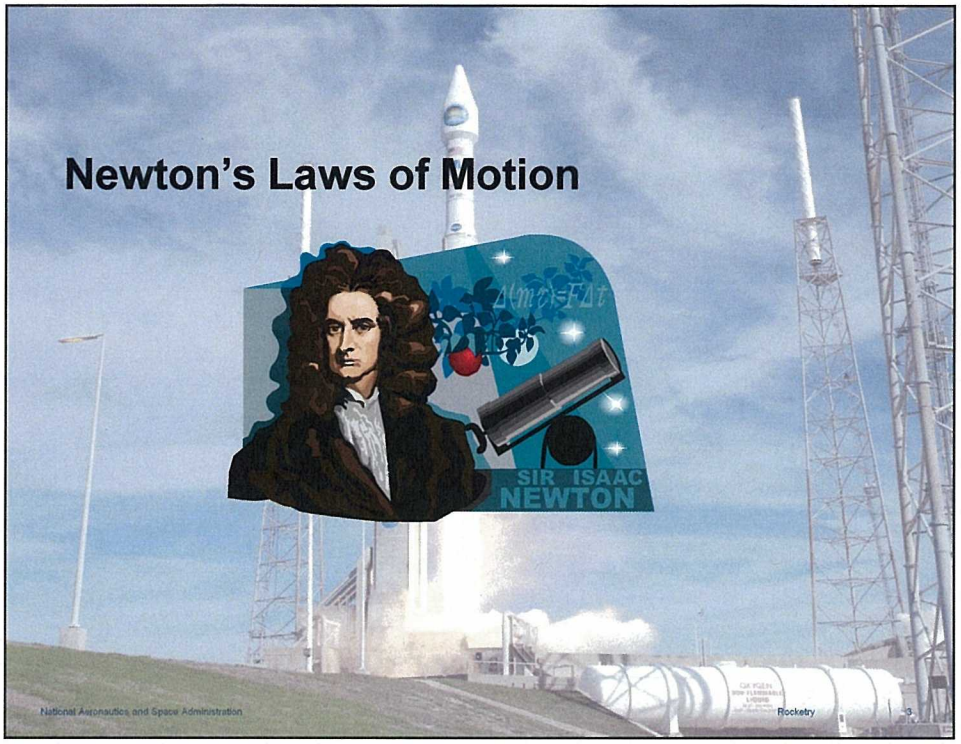
Have fun.

Good luck!

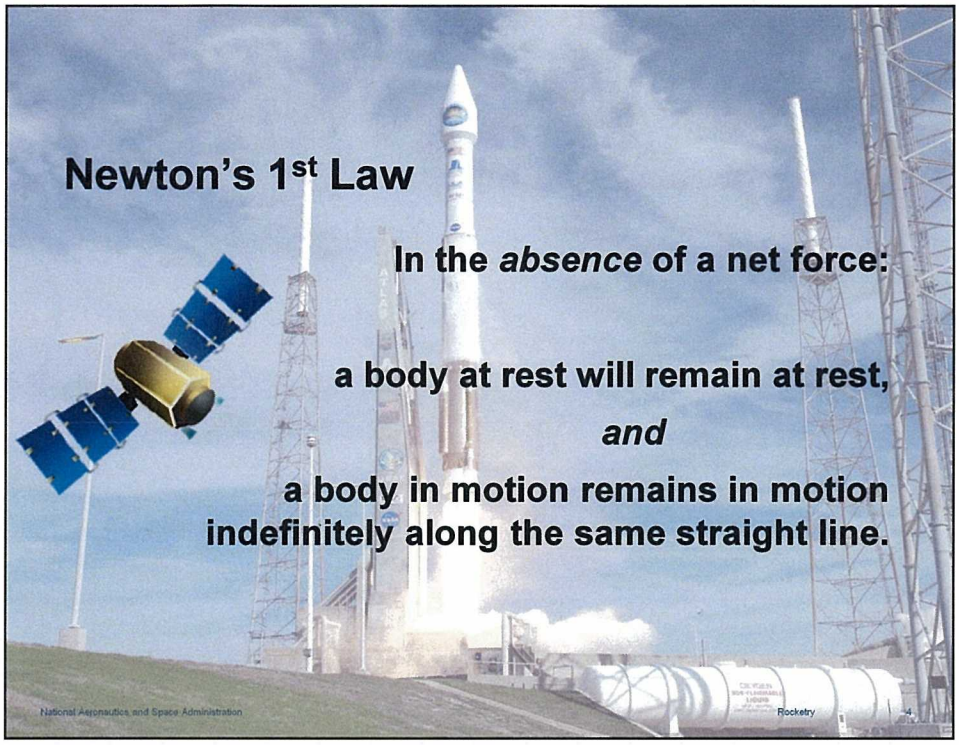
Pictured is the Atlas V rocket carrying the Lunar Reconnaissance Orbiter (LRO) and the Lunar Crater Observation and Sensing Satellite (LCROSS).



NASA's mission and focus. Feel free to discuss your job at NASA and how this mission statement relates to what you do.

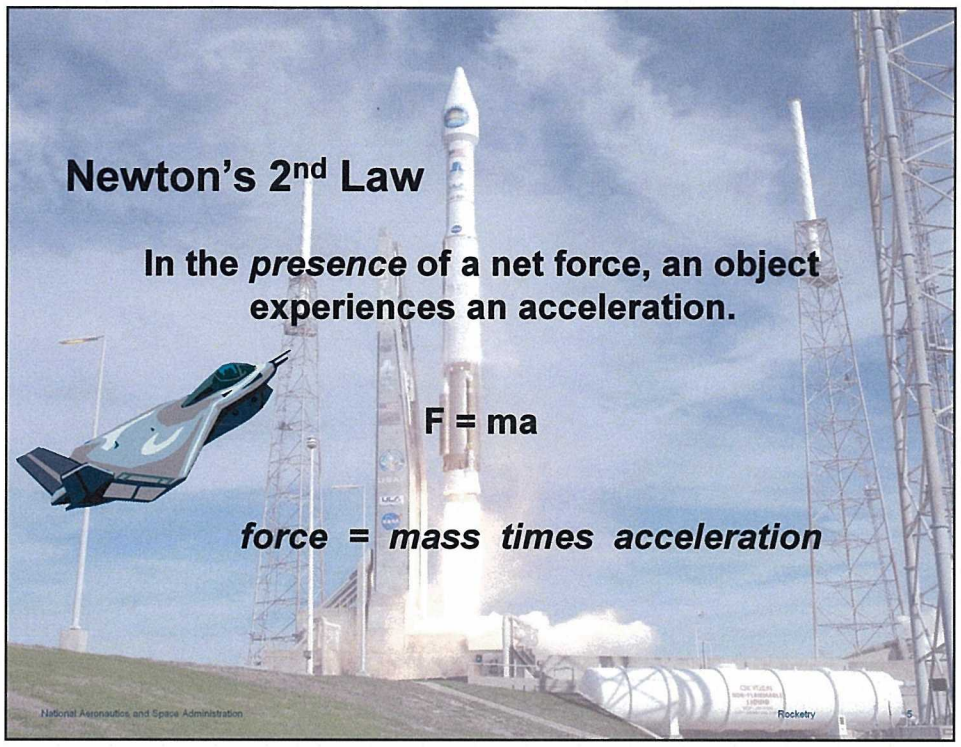


Feel free to give examples of each of the laws (involving students in those examples is a very good idea) but move pretty quickly through these.

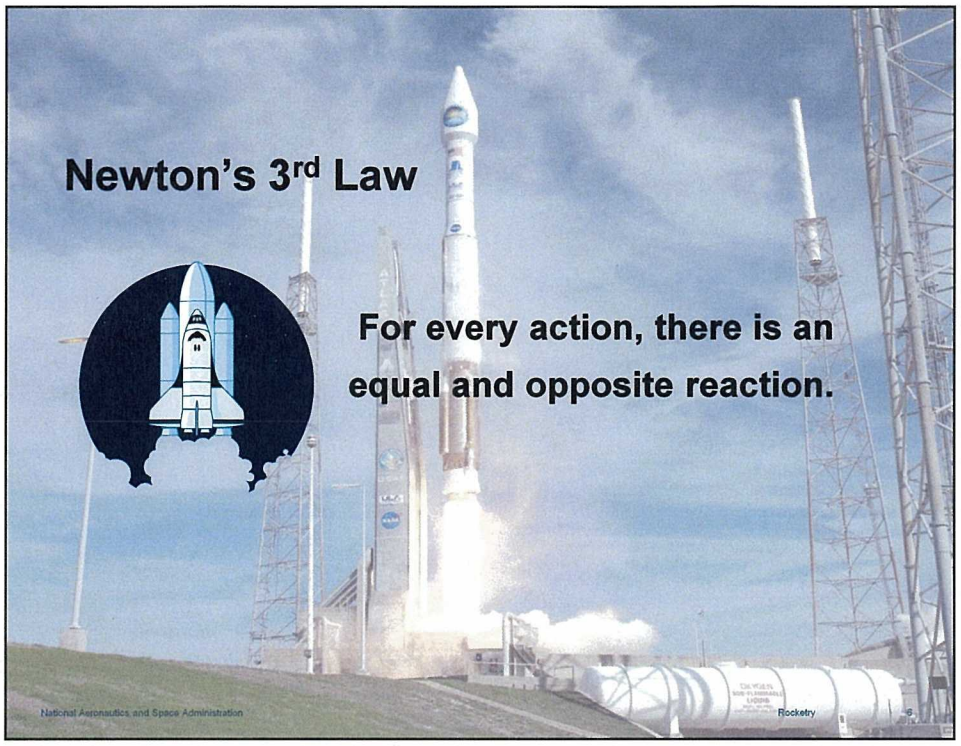


Maybe look at a student who is sitting in a chair. The "body"' remains at rest.

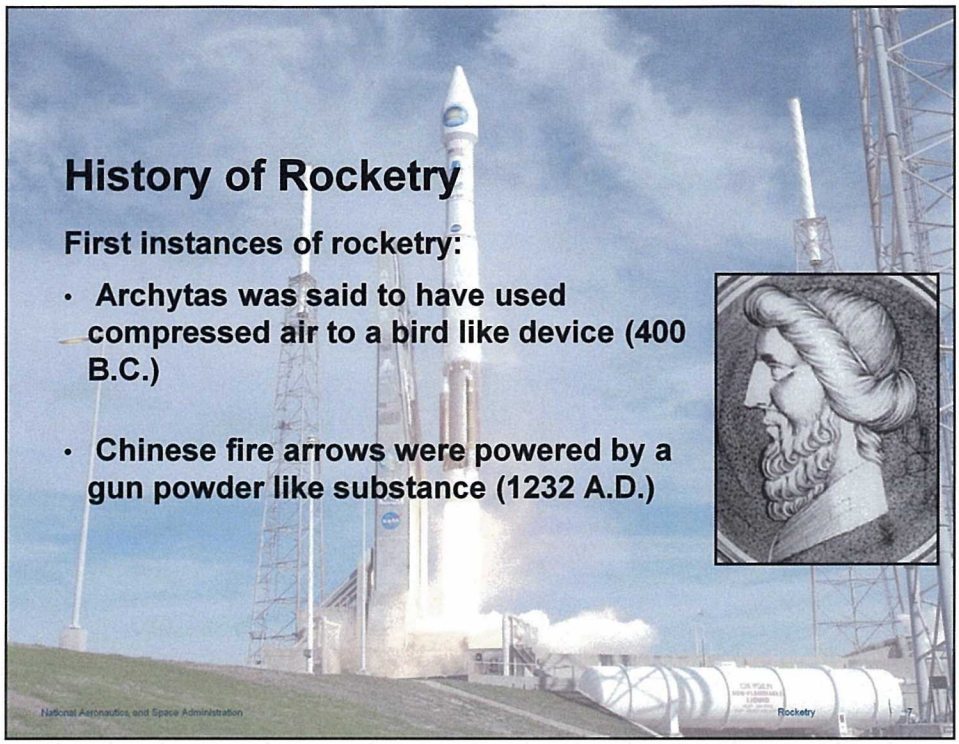
A train is a great example of both of these. When the train is at rest it requires great effort to move it. When the train does get up to speed it take a great amount of distance and energy to stop.



Hold a book out at shoulder height and ask if there is a net force or not. Then ask if you drop the book would there be a net force. What happens when you do let go? If there is a net force what does that mean is happening to the book? It is accelerating.



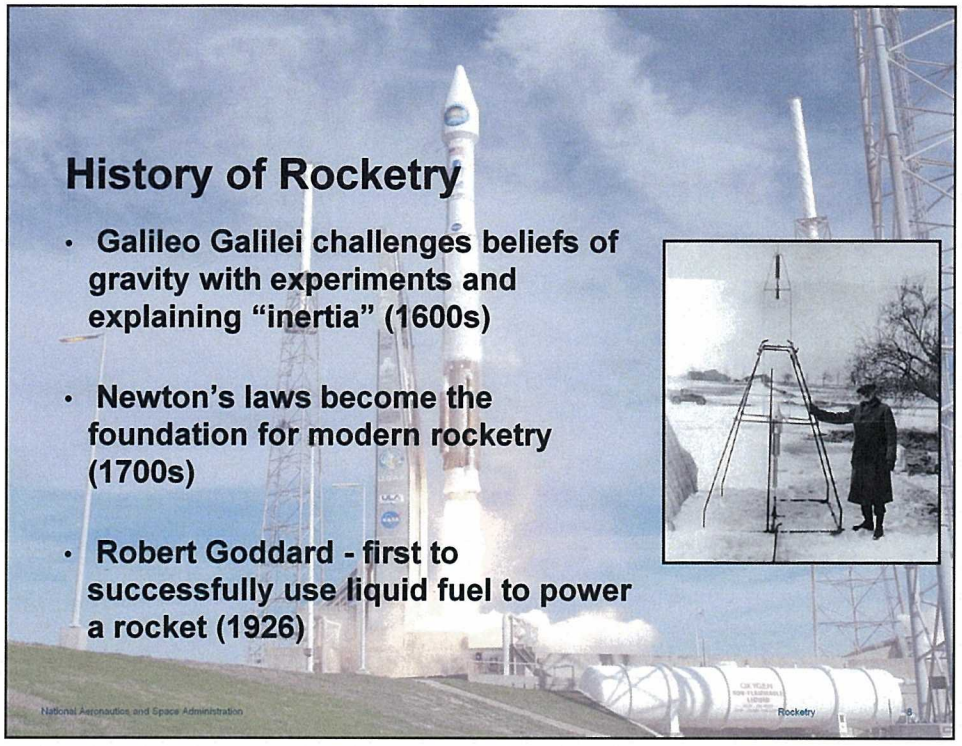
What about pushing against a stationary object while sitting in a rolling chair. If you were to punch a brick wall what happens? Why does it hurt? The brick wall actually "punches back".



This and the following slides introduce the history of rocketry. You may also introduce what a rocket is.

A rocket is a type of engine that pushes itself forward or upward by producing thrust. Unlike a jet engine, which draws in outside air, a rocket engine uses only the substances carried within it. As a result, a rocket can operate in outer space, where there is almost no air. A rocket can produce more power for its size than any other kind of engine. For example, the main rocket engine of the space shuttle weighs only a fraction as much as a train engine, but it would take 39 train engines to produce the same amount of power. The word rocket can also mean a vehicle or object driven by a rocket engine.

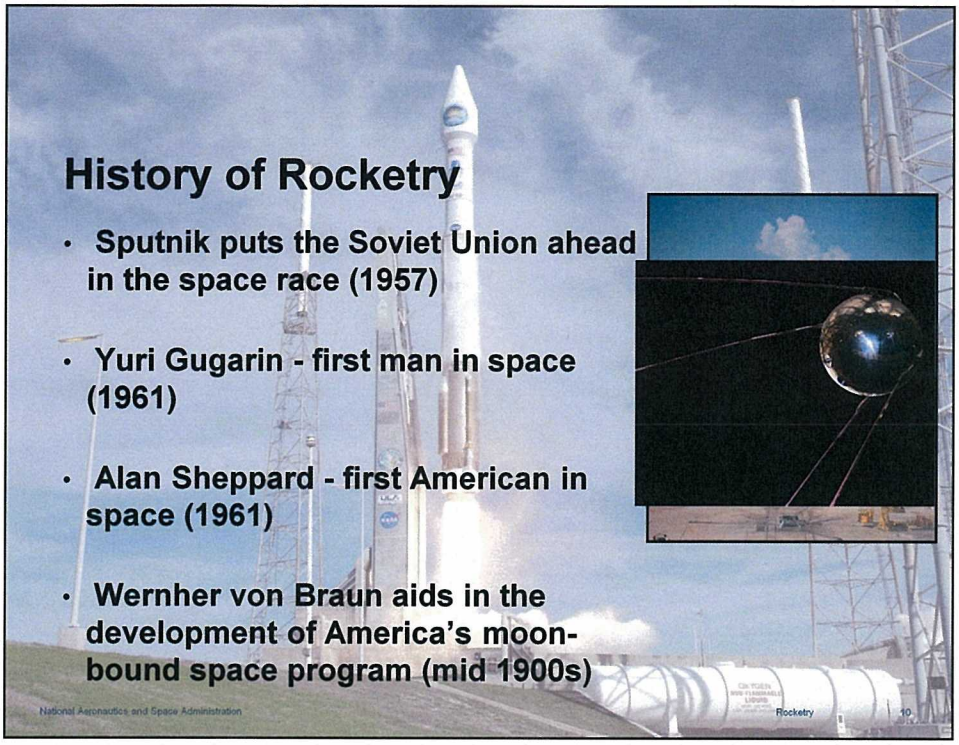
Feel free to elaborate as much as you want or breeze through it. Just remember, you don't want to get caught up in the little details. Think big picture and if they ask questions you can tackle those little things! The older the students the more details they can hang on to.



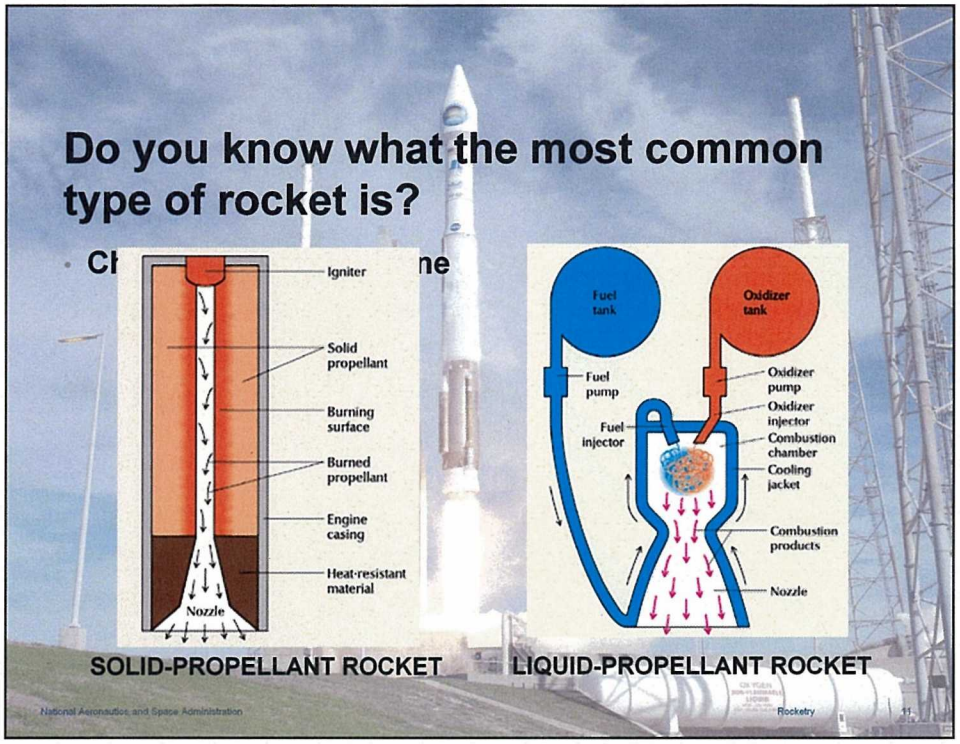
Robert Goddard is pictured.

History of Rocketry

- The Saturn V Rocket is designed to carry humans to the moon and back safely (1967-1972)
- Neil Armstrong - first man to step foot on the on the moon (1969)
- The Space Shuttle - first reusable space flight vehicle (1981)
- Rockets continue to be used today



It would be a great idea to discuss the Cold War. Talking points may include how Sputnik and Gugarin were big hits to America and JFK's goal set in 1961 to get a man to the moon and back safely within the decade.



Rocket engines are distinguished b the type of mechanism used to produce exhaust material. The simplest "engine" is a compressed air bottle attached to a nozzle. The exhaust gas is stored in the same form as it appears in the exhaust. Ejection of compressed air, or other gas, from a nozzle is a perfectly satisfactory rocket operation for some purposes.

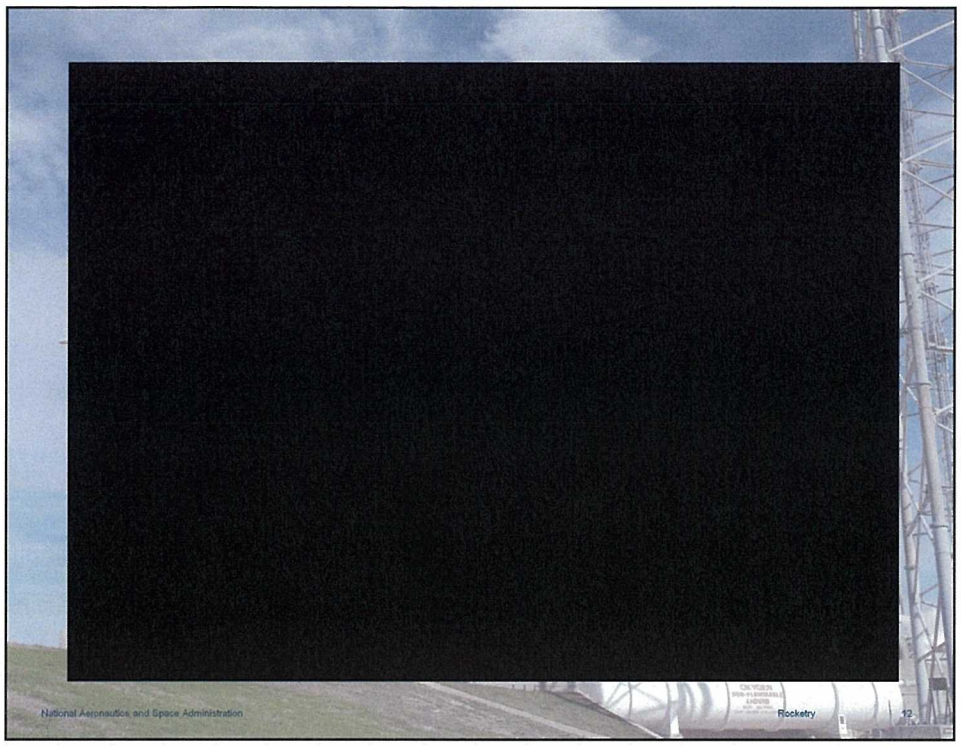
The most common rocket engine is the chemical type in which hot exhaust gases are produced by chemical combustion. The chemicals or *propellants*, are of two types, *fuel* and *oxidizer* corresponding to gasoline and oxygen in an automobile engine. Both are required for combustion. They may be solid or liquid chemicals.

Left Image: Solid-propellant rocket

In the solid-chemical rocket, the fuel and oxidizer are intimately mixed together and cast into a solid mass, called a *grain*, in the combustion.

Right Image: Liquid-propellant rocket

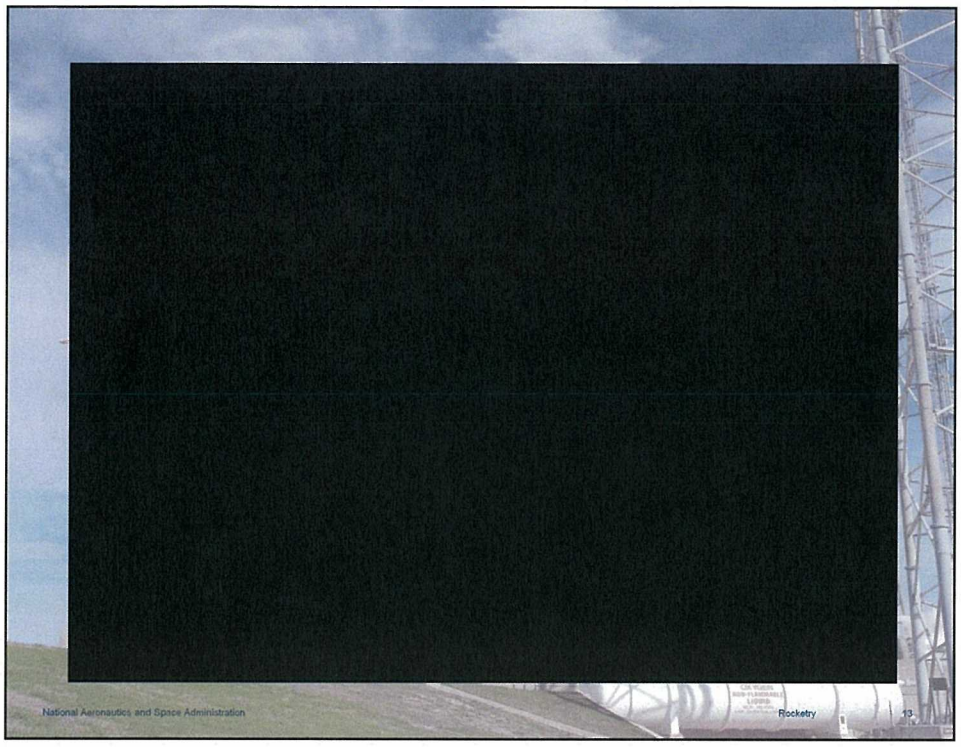
The common liquid rocket is bipropellant; it uses two separate propellants, a liquid fuel and liquid oxidizer. These are contained in separate tanks and are mixed only upon injection into the combustion chamber. They may be fed to the combustion chamber by pumps or by pressure in the tanks.



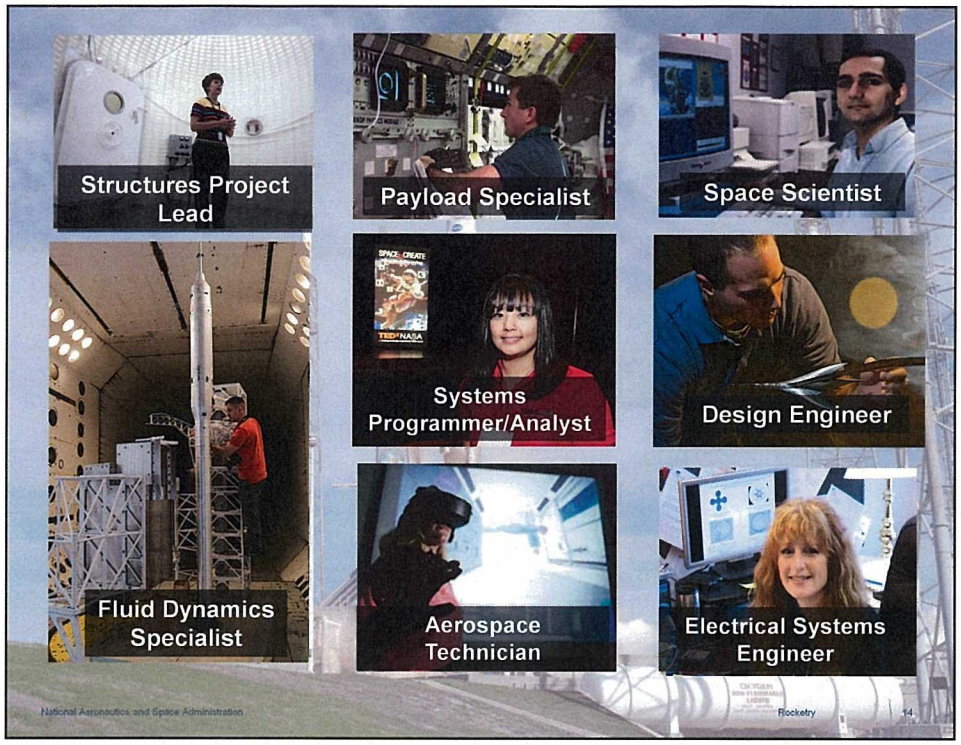
The Space Shuttle is a great example of the two types of chemical rockets used together.

The Solid Rocket Boosters are solid-propellant rockets, hence the name.

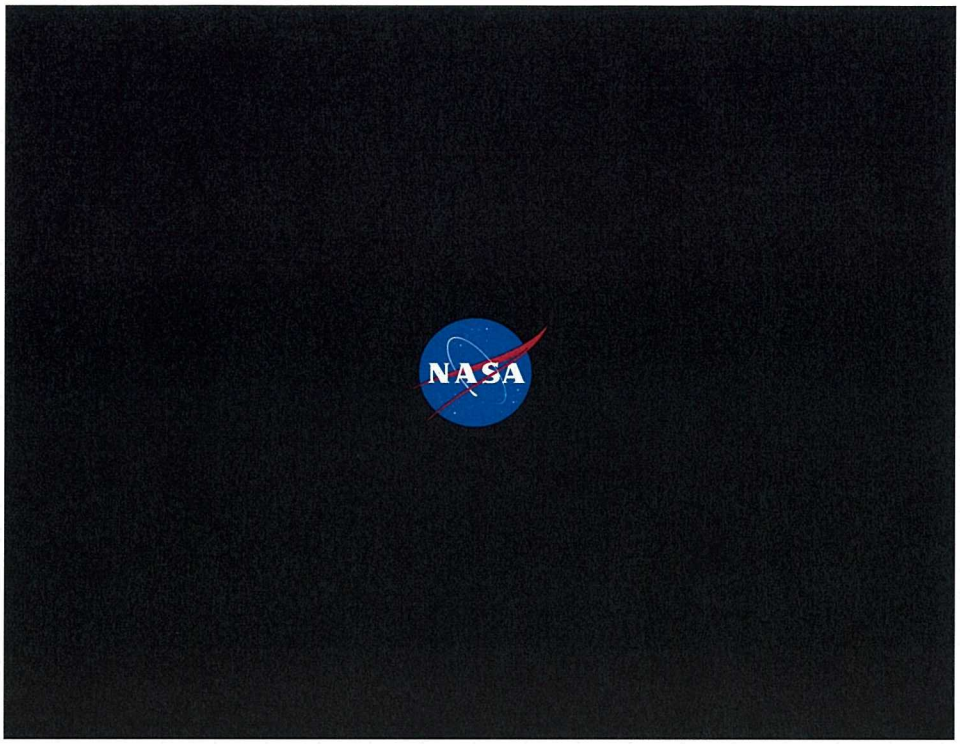
And the External Tank is an example of the liquid-propellant rocket which utilizes Liquid Oxygen (LOX), the oxidizer, and Liquid Hydrogen (LH2), the fuel.



Launch Services Program is an additional NASA Program and is represented in this video.



Here is a list of exciting careers that students can pursue relating to STEM (science, engineering, technology, mathematics) in the field of rocketry.



NASA Presentation Sign-Off Page