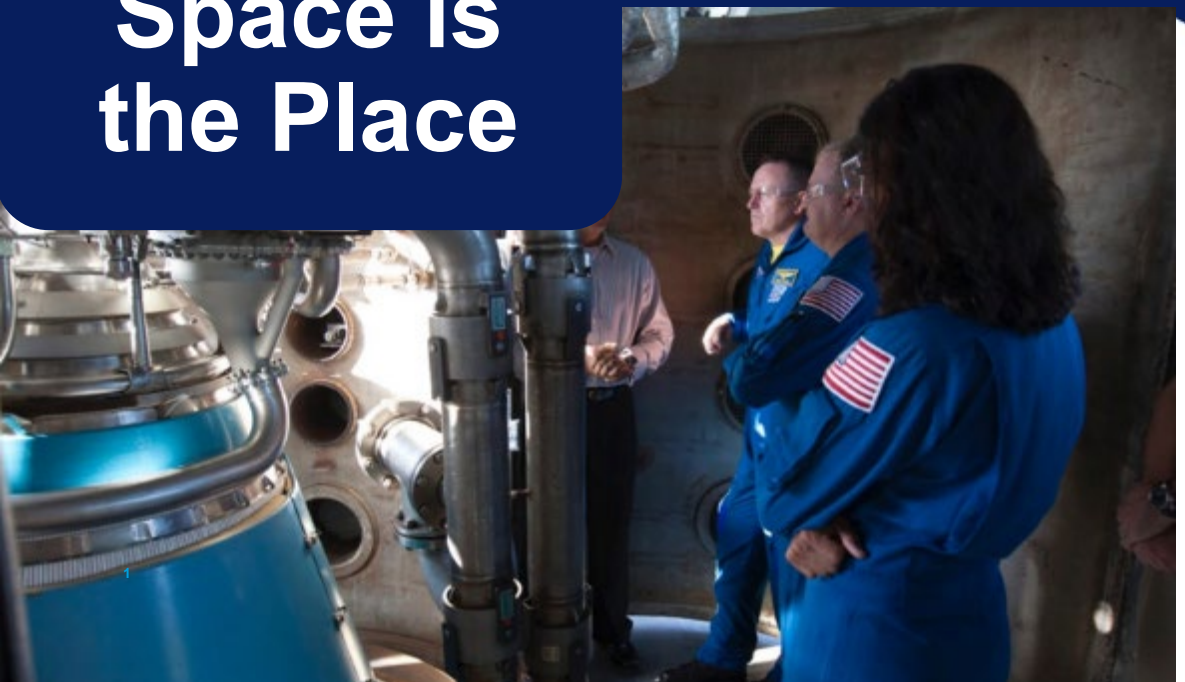
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[Mars Perserverance Video]

[Astronauts to ISS Video]

Space is the Place





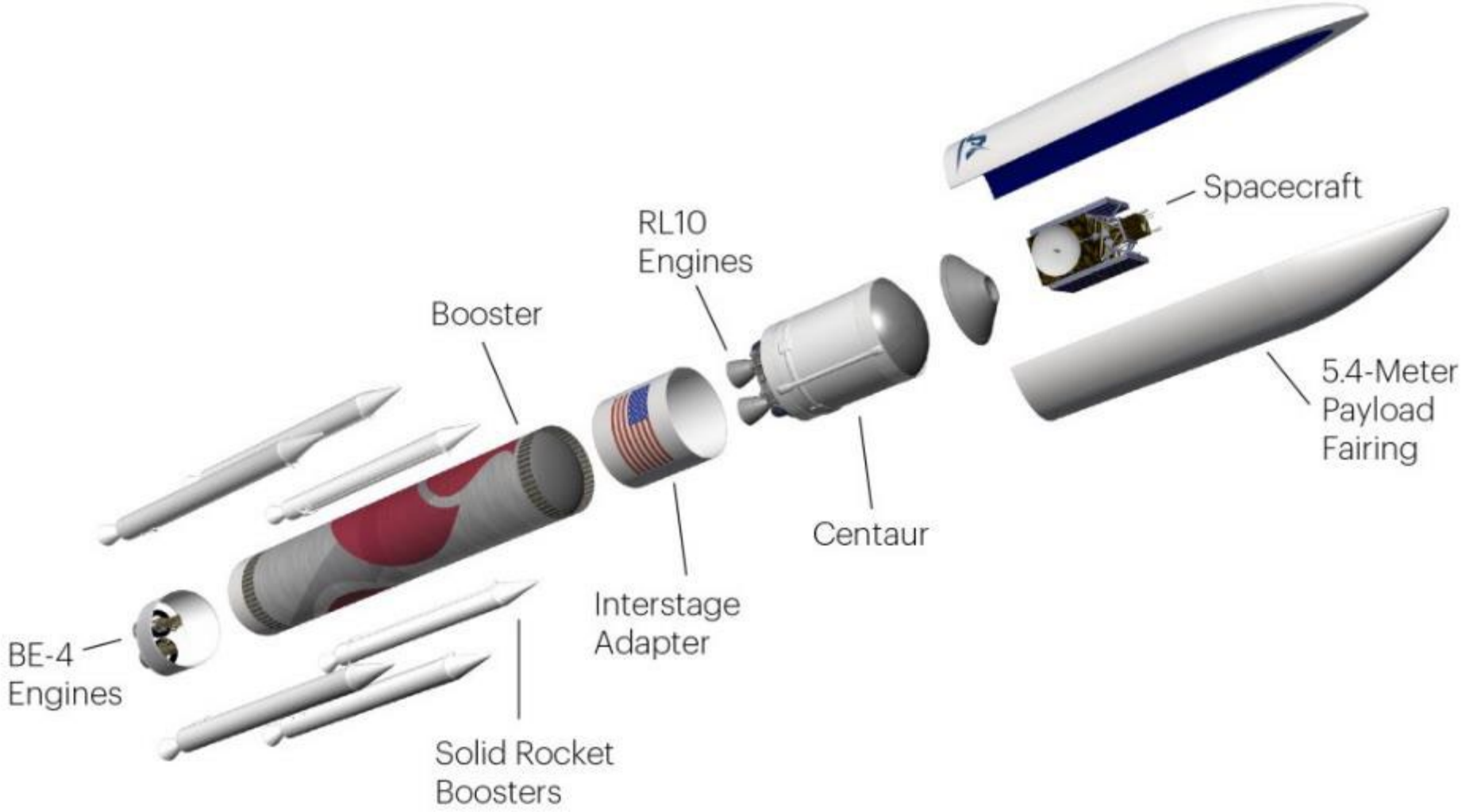
Rockets



- Spacecraft, aircraft, vehicle or projectile
- Thrust comes from a rocket engine
- Rocket engine exhaust is formed from propellant carried in the rocket, and is what makes it fly

Main Sections of a Rocket

United Launch Alliance Vulcan Rocket



Propulsion



Space engines create their own exhaust and push against it in order to fly – like you can see here.

This is the SpaceX Demonstration Mission-2.

The FAA played a key role in this launch with NASA.

[How Rockets Fly Video]

Commercial Space Flight



FAA has worked in close partnership with NASA since the beginning of the Commercial Crew Program.

FAA Commercial Crew Video

Commercial Spaceports



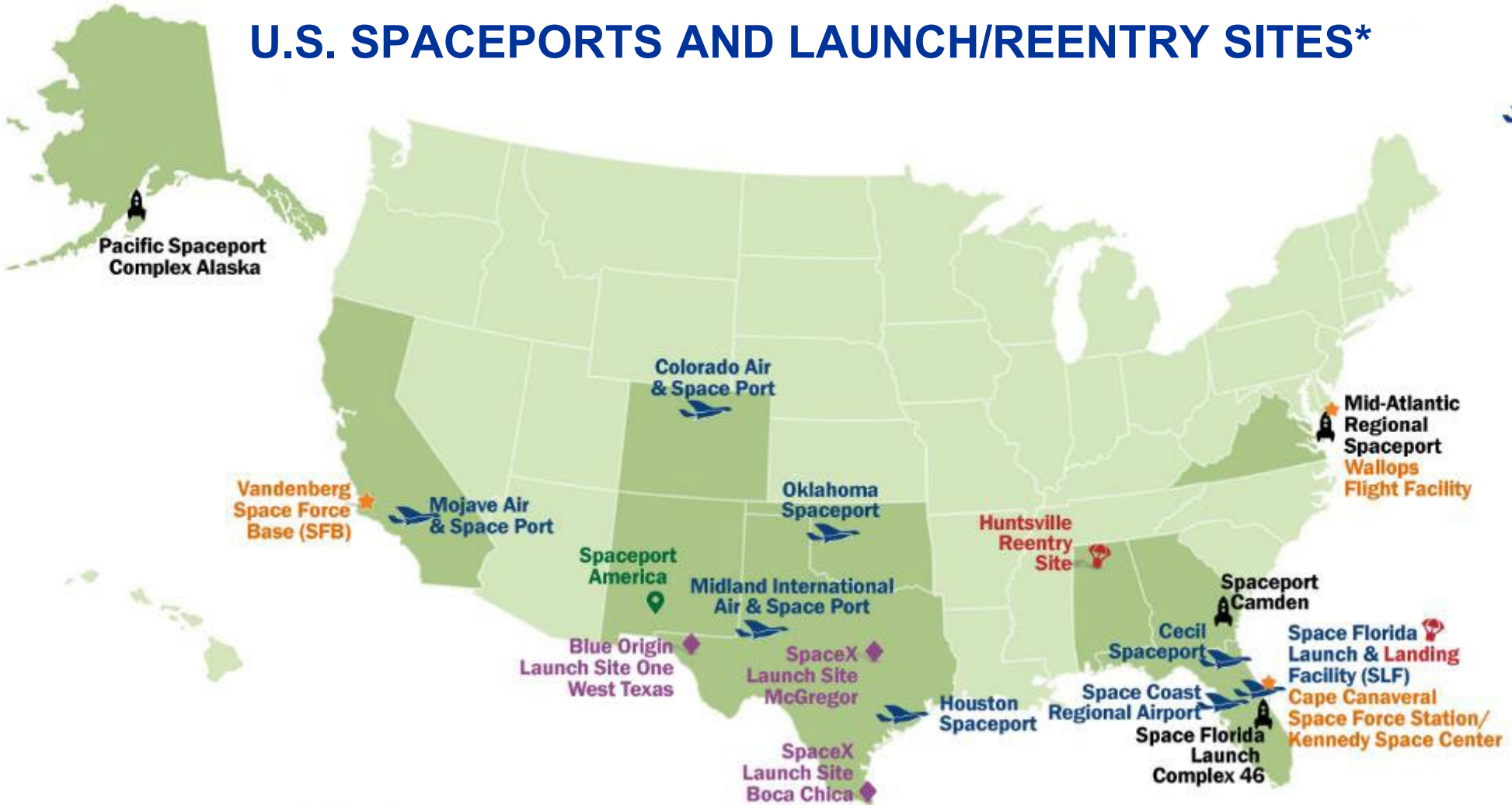
There are 14 FAA licensed spaceports in the United States

[Spaceport Map]

[Spaceports by State Website]

14 Licensed U.S. Launch & Reentry Sites –"Spaceports"

U.S. SPACEPORTS AND LAUNCH/REENTRY SITES*



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MAP LEGEND

- States with Current Spaceports
- FAA-Licensed Horizontal Launch Site
- FAA-Licensed Vertical Launch Site
- FAA-Licensed Horizontal and Vertical Launch Site
- FAA-Licensed Reentry Site
- U.S. Federal Site
- Exclusive Use Site (Non-FAA Licensed)

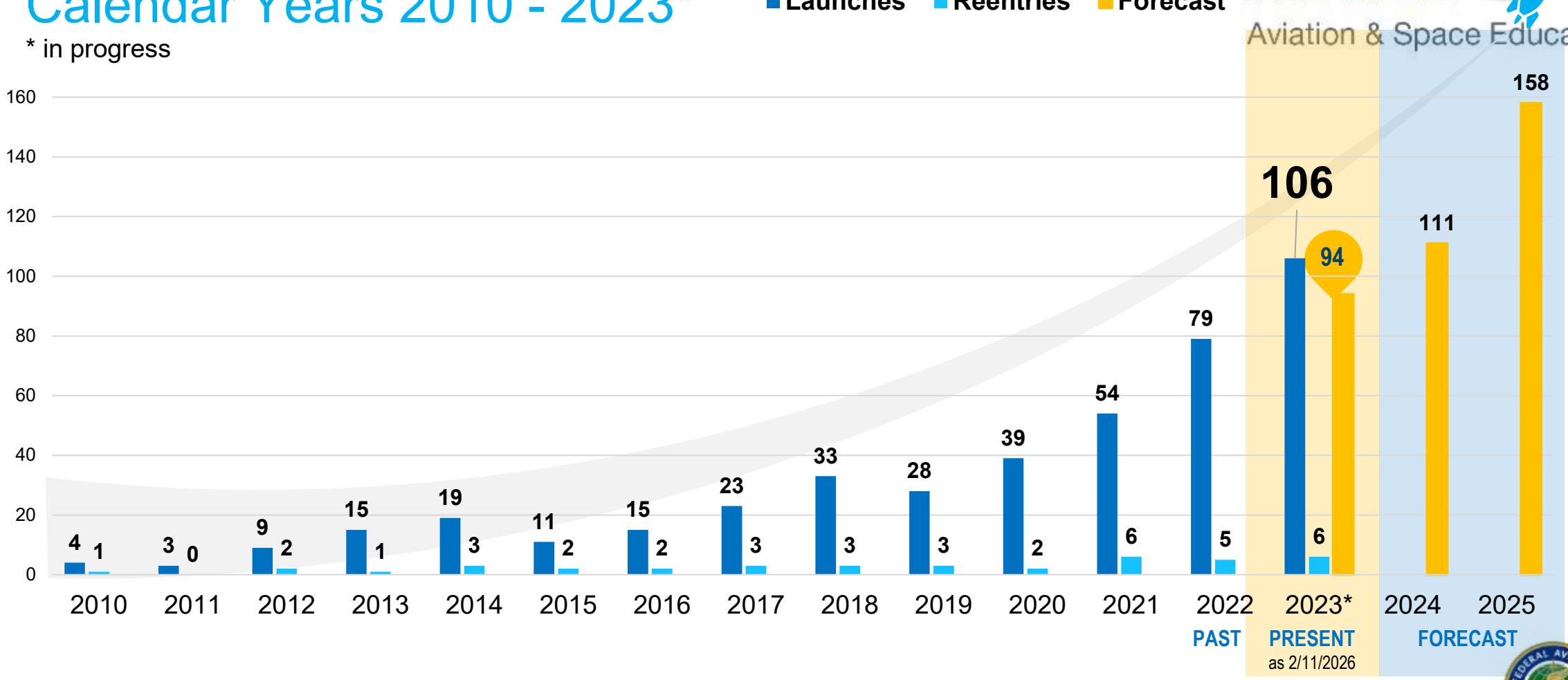
*Locations licensed by the FAA or currently hosting FAA-licensed activity.

FAA/AST October 2022

Cadence

Calendar Years 2010 - 2023*

* in progress



Space Tourism

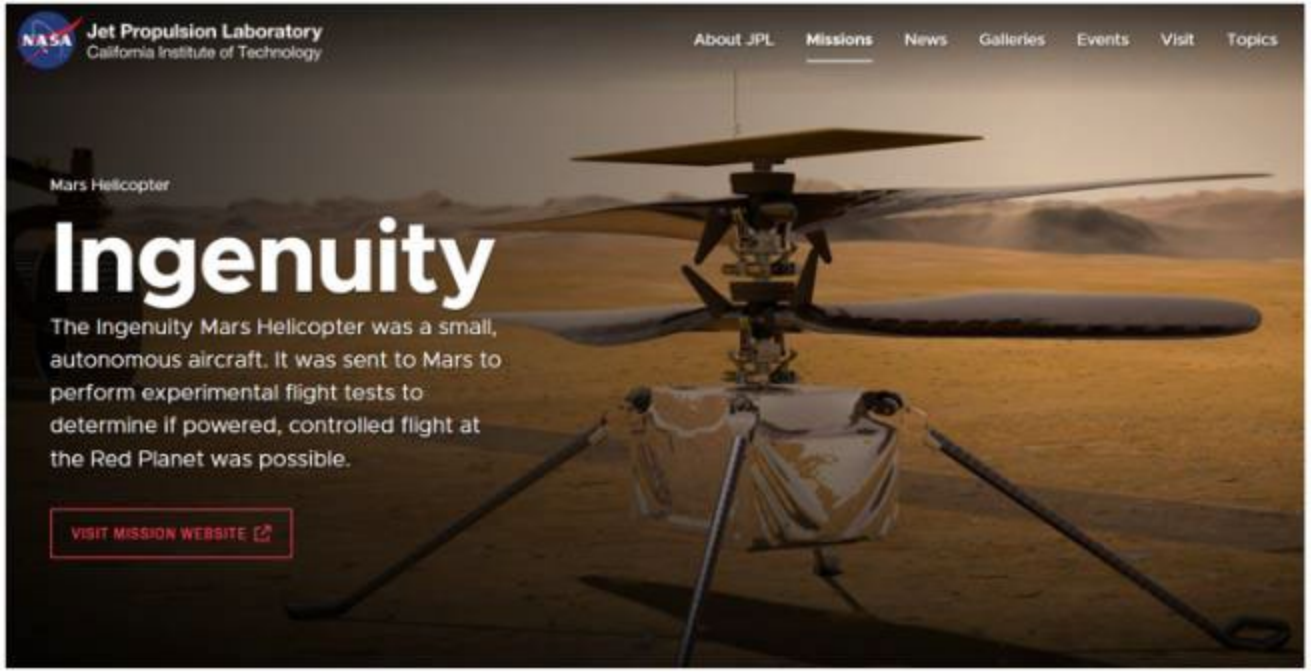


More and more commercial spaceflights means that soon people can become Space Tourists!

[Commercial Space Data]

[Blue Origin New Shephard Launch Video]

NASA's Mars Helicopter: Ingenuity



Visit the Ingenuity Mission Website!

Check out this cool video celebrating Ingenuity's successful 50 flights (from April 19, 2021 to April 2023)!

Significant leap in Rocket Technology and Accomplishment…
SpaceX Makes History Catching Rocket on Landing
https://youtu.be/RYUr-5PYA7s?si=YTK1nlJhu7sJjxU9

- Remember Mars Mission from the beginning? The Perseverance rover?
- Well, the Ingenuity Mars Helicopter was a small aircraft carried to the surface of the Reg Planet attached to the belly of the Perseverance rover!
- Deployed to the surface on April 4, 2021.
- On April 19, 2021, it became the first aircraft in history to make a powered, controlled flight on another planet!
- Flight on Mars is challenging because the Red Planet has a significantly lower gravity – one-third that of Earth's – and an extremely thin atmosphere with only 1% the pressure at the surface compared to our planet.

Activity: Straw Rocket!

https://youtu.be/aTd2f59TSVo?si=XjY8f820m7GmnMhT

Jet Propulsion Laboratory
California Institute of Technology

jpl.nasa.gov/edu/learn

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K-12 Students

Make a Straw Rocket

Create a paper rocket that can be launched from a soda straw – then, modify the design to make the rocket fly farther!

Materials

- Pencil
- Scissors
- Tape
- Soda straw (plastic or reusable)
- Meter stick or measuring tape
- Rocket template and data log

1. Cut out and shape the rocket body

Cut out the rectangle. This will be the body tube of the rocket. Wrap the rectangle around a pencil length-wise and tape the rectangle so that it forms a tube.

2. Cut out and attach the fins

Cut out the two fin units. Align the bottom of the rectangle that extends between the fins with the end of the rocket body, and tape the fin to the body tube. Do the same thing for the other fin on the opposite side, making a "fin sandwich."

3. Bend the fins

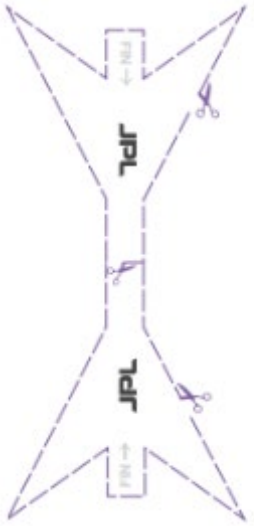
Bend the fins on each fin unit 90 degrees so that they are each at a right angle to each other. When you look along the back of the rocket, the fins should form a "+" mark.

4. Make and measure the nose cone

Twist the top of the body tube into a nose cone around the sharpened end of your pencil. Measure your nose cone from its base to its tip and record the length on the data log and on the rocket itself.

5. Prepare to launch!

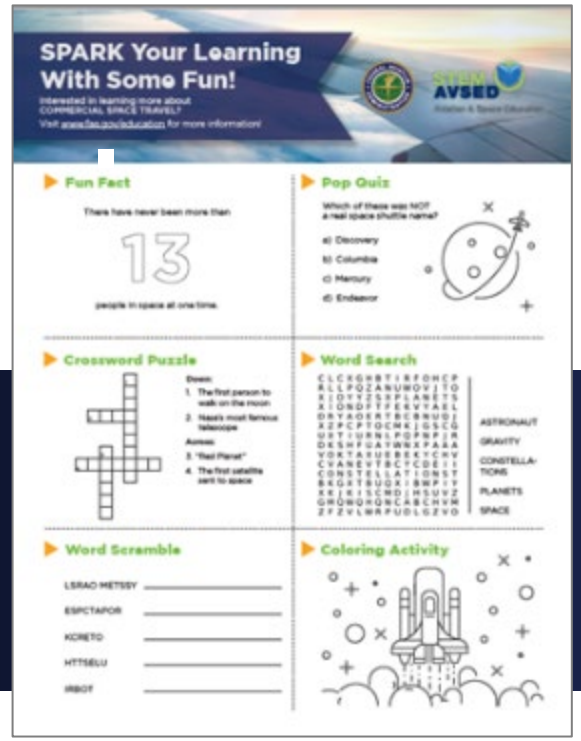
Remove the pencil and replace it with a soda straw. Be sure your launch area is clear of people and hazards. Then, blow into the straw to launch your rocket! Record the distance the rocket travels on your data log.



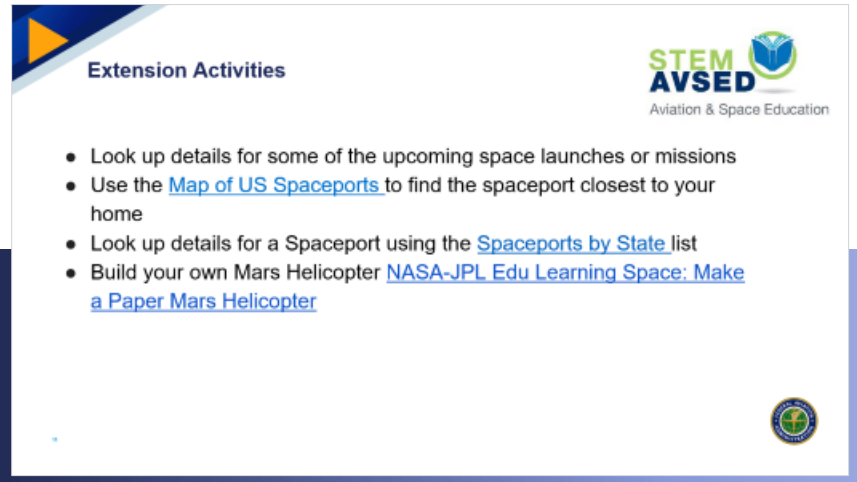


Continue Learning

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SPARK Sheet



Extension Activities



www.faa.gov/education/

Extension Activities

- Look up details for some of the upcoming space launches or missions
- Use the Map of US Spaceports to find the spaceport closest to your home
- Look up details for a Spaceport using the Spaceports by State list
- Build your own Mars Helicopter NASA-JPL Edu Learning Space: Make a Paper Mars Helicopter

Spacecraft Landing on the Moon Activity

Draw your own spacecraft landing on the moon