



# AERONAUT-X



## Zoom Without the Boom: Looking to the Future of NASA Aeronautics Innovation

*(It is recommended that users download [Adobe Acrobat Reader](#) for a full interactive experience!)*





## WHAT IS AERONAUTICS?



**The term aeronautics originated in France, and was derived from the Greek words for “air” and “to sail.” It is the study of flight and the operation of aircraft.**

# NASA Aeronautics Research



**NASA's aeronautics research is primarily conducted at four NASA centers: Ames Research Center and Armstrong Flight Research Center in California, Glenn Research Center in Ohio, and Langley Research Center in Virginia.**

# How does an airplane fly?



There are four forces in flight that enable an airplane to fly: Thrust, Drag, Weight, and Lift.

A force can be thought of as a pushing or pulling motion in a specific direction. It is referred to as a vector quantity, which means it has both a magnitude (quantity or amount) and a direction.

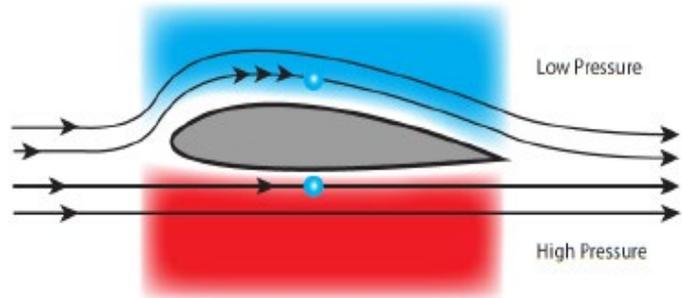
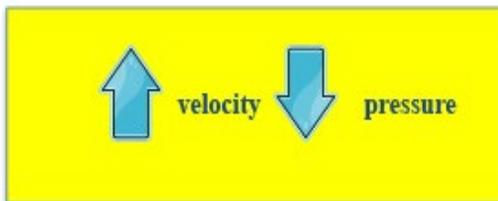
Thrust is a force that moves the airplane forward through the air.

Drag is a force that opposes thrust. It is a type of friction and makes objects harder to move.

Weight is the force caused by gravity.

Lift is a force that allows an aircraft to climb or stay in the air, rather than fall to the ground.

# Bernoulli's Principle-Lift Force



**Lift is the force that results from moving air over the airplane's wings. The wing shape has a lot to do with providing the lift force.**

**Wings are shaped to cause air to move faster, and it lowers the air pressure on top of the wings.**

**Under the wing, the air pressure is greater, so the wing is pushed up by the air underneath the wing, and therefore helps the airplane fly!**

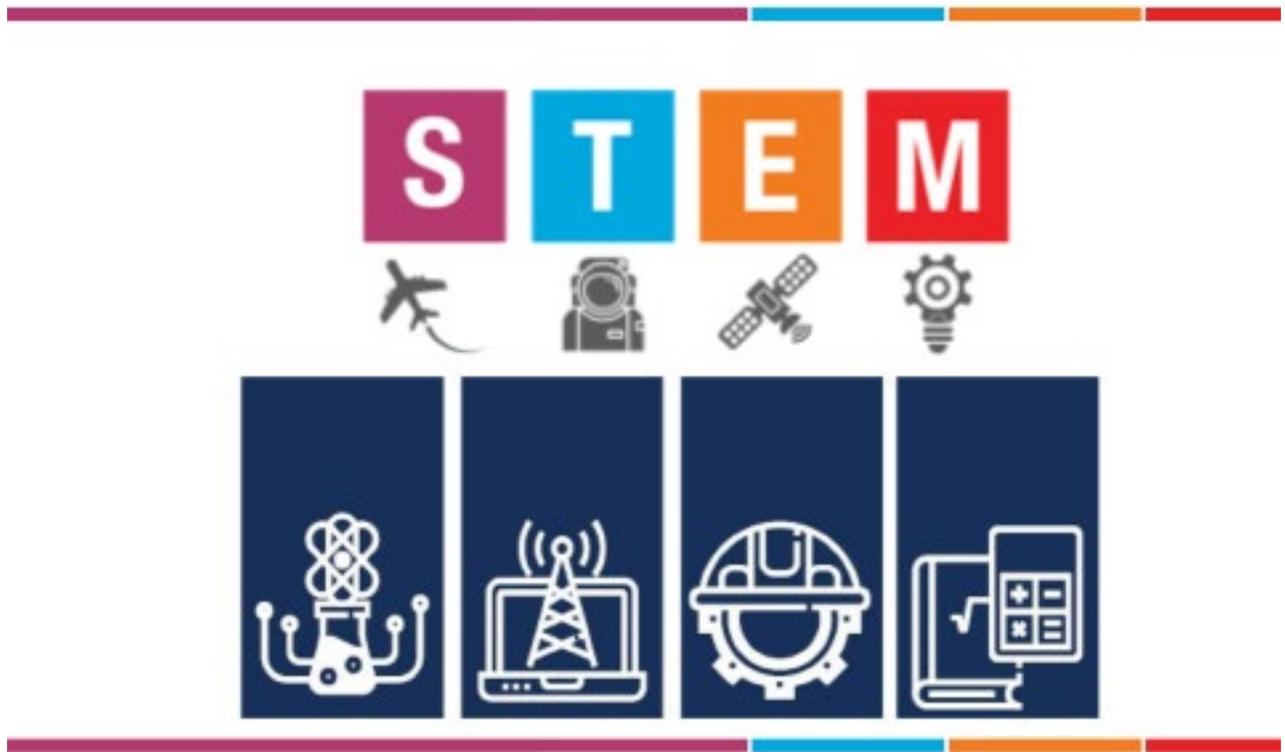
# Aviation Touches Us



*Click the video to learn more about NASA aeronautics.*

**NASA aeronautics has made decades of contributions to aviation. Every U.S. commercial aircraft and U.S. air traffic control tower has NASA-developed technology on board that helps improve efficiency and maintain safety. Research conducted by ARMD or the Aeronautics Research Mission Directorate directly benefits today’s air transportation system, the aviation industry, and the passengers and businesses who rely on aviation every day.**

# Aeronautics Research Mission Directorate



**ARMD scientists, engineers, programmers, test pilots, facilities managers and strategic planners are focused on aviation's future. They design, develop and test advanced technologies that will make aviation much more environmentally friendly, maintain safety in more crowded skies, and ultimately transform the way we fly.**

# 60 Years and Counting



*Click the video to learn more about the history of X-Planes.*

**For over seven decades, the nation's best minds in aviation have designed, built, and flown a series of experimental airplanes to test the latest imaginative and cutting edge ideas related to flight. Watch this video to learn more about the evolution of experimental aircraft.**

# Zoom Without the Boom



*Click the video to learn more about NASA's supersonic research.*

**NASA's supersonic research is leading the way into a new era of aviation. Our historical research has resulted in cutting-edge technology and a unique aerodynamic design that will demonstrate the ability to fly faster than the speed of sound without creating a loud sonic boom.**

**This will be done in flight, through the agency's newest supersonic X-plane, the X-59 Quiet SuperSonic Technology or (QueSST) aircraft.**

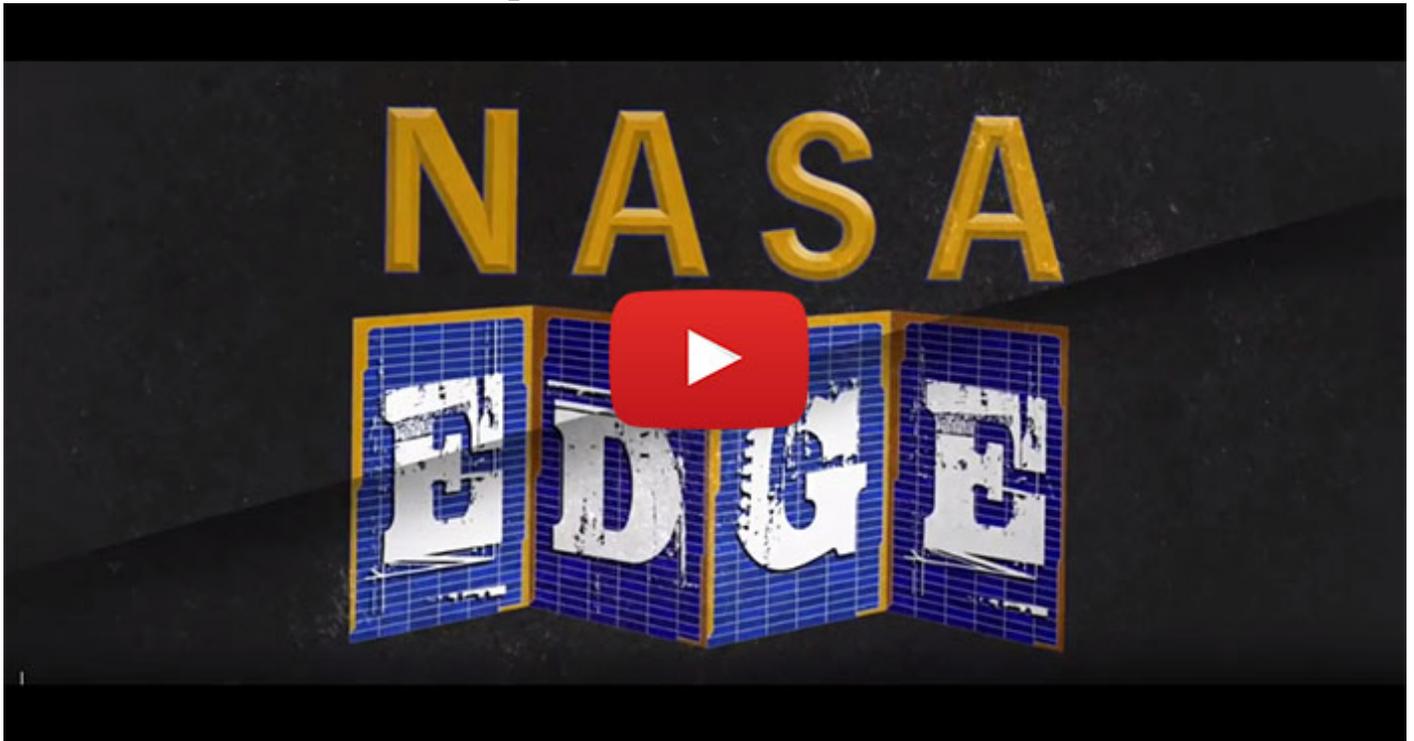
## WHAT IS A SONIC BOOM?

But, what is a Sonic Boom? And what exactly does it mean to break the sound barrier? Let's take a listen.



*Click the video to learn more about the sound a Sonic Boom makes.*

# The Future of Commercial Supersonic Travel



*Click the video to learn more about the future of commercial supersonic travel.*

**NASA will utilize community response technologies in anticipation of the X-59, which will be used to measure public response to sonic thumps beginning in 2023. The scientifically valid data gathered from these community overflights will be presented to U.S. and international regulators, who will use the information to help them come up with rules based on noise levels that enable new commercial markets for supersonic flight over land.**



**The goal of this effort is to enable future supersonic vehicles to operate overland using criteria for acceptable sonic boom noise levels and accurate validated analysis tools for low-boom design and advanced configurations. If this regulation is passed, a U.S. coast-to-coast flight could take only three hours instead of six or seven.**

# NASA Careers



**NASA intends to successfully design, build and fly a fleet of X-planes inspiring the aviation industry and the next generation workforce in order to drive our economy to new heights!**

**It's the power of team spirit here at NASA that moves us forward. We invite you to learn more and explore careers at NASA today!**

**[Visit the NASA career website and launch your career with NASA!](#)**