

NASA AT 50

1963: Lifting Body Design Concept Tested

Teacher's Guide



Grade Level: 6–12 **Curriculum Focus:** Science, Social Studies **Running Time:** 4 minutes

Introduction

NASA at 50 acquaints students with key innovations and milestones in chemistry, physics, engineering, and space exploration from NASA's fifty-year history. Each clip serves as a gateway for extended lessons in science and history, promoting critical thinking and inquiry as essential components of scientific literacy.

Program Description

Profiles the development of the lifting body design, a wingless aircraft that later served as the basis for the space shuttle. The program details how the lifting body evolved from the ballistic design of the first space capsules after NASA engineers wanted to build a reusable spacecraft. Although the design did not have wings, the shape of the body created sufficient lift to fly. Today, research from the lifting body program is being used to design new vehicles, like the X-38.

Learning Objectives

After viewing the program and participating in discussion, students will be able to:

- Explain the importance of the lifting body design;
 - Describe how the lifting body design evolved into the space shuttle;
 - Identify how the lifting body design was constructed;
 - Understand how sound moves through air and calculate a Mach number.
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Classroom Connections

If an aircraft built with the lifting body design has no wings, how would it fly?

Why did NASA not support Dale Reed in constructing model aircraft that featured the lifting body design?

What were some of the materials used to build the model aircraft with the lifting body design?

What did NASA engineer Dale Reed say was the most exciting moment for him?

Classroom Activities

Other aircraft models that featured the lifting body design have reached a speed of Mach 1.88. What is the Mach scale? What is the equivalent of Mach 1? How is a Mach number calculated? What two pieces of data are needed to calculate a Mach number? What are the five categories of high-speed flow, and what are the Mach measurements for each one?

Target Vocabulary*

Mach - a number representing the ratio of the speed of a body (as an aircraft) to the speed of sound in a surrounding medium (as air)

mahogany - the wood of any of various chiefly tropical trees

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Academic Standards

National Science Teachers Association

The National Science Teachers Association (NSTA) has developed national standards to provide guidelines for teaching science. To view the standards online, go to

<http://www.nsta.org/publications/nses.aspx>.

This guide addresses the following standards:

- Science and Technology
- Earth and Space Science
- People, Places, and Environments
- Science in Personal and Social Perspectives
- History and Nature of Science

National Council for the Social Studies

The National Council for the Social Studies (NCSS) has developed national standards to provide guidelines for teaching social studies. To view the standards online, go to

<http://www.socialstudies.org/standards/strands/>.

This guide addresses the following standards:

- Time, Continuity, and Change
- Science, Technology, and Society
- Individuals, Groups, and Institutions