

NASA AT 50

1987: Icing Research Tunnel Designated as Historic Landmark

Teacher's Guide



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

Tours the Icing Research Tunnel (IRT), a National Historical Mechanical Engineering Landmark that tests and develops icing protection systems for aircraft. The program notes that ice buildup on a plane's wing or engine can cause drag and affect a plane's lift. The IRT's unique facilities allow researchers to test how ice accumulates on a plane's exterior and develop new methods for removing ice during flight. NASA's research at the IRT has directly contributed to better de-icing systems and fewer crashes as a result of ice.

Learning Objectives

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

- Explain why the IRT was developed;
 - Describe how icing affects an aircraft during flight;
 - Identify how the IRT functions.
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Classroom Connections

Describe what the Icing Research Tunnel is (IRT).

How does the IRT simulate icy conditions?

Where does icing happen? Why is icing so dangerous? How does ice affect an aircraft's lift?

What are some ways for preventing or dealing with icing during a flight?

Classroom Activities

Have students research the science of flight, specifically how an aircraft achieves lift. Working in groups, students should draw a model of an airplane wing and use arrows to indicate air flow. If possible, students should build a model wing or airfoil (the wing need not be part of a working aircraft). Groups should also include an explanation of how commercial airplanes fly, defining terms like propulsion, thrust, lift, and drag.

Target Vocabulary*

aileron - a movable airfoil at the trailing edge of an airplane wing that is used for imparting a rolling motion especially in banking for turns

Celsius - relating to, conforming to, or having the international thermometric scale on which the interval between the triple point of water and the boiling point of water is divided into 99.99 degrees with 0.01° representing the triple point and 100° the boiling point

drag - the retarding force acting on a body (as an airplane) moving through a fluid (as air) parallel and opposite to the direction of motion

lift - the component of the total aerodynamic force acting on an airplane or airfoil that is perpendicular to the relative wind and that for an airplane constitutes the upward force that opposes the pull of gravity

pneumatic - of, relating to, or using gas (as air or wind)

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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
- People, Places, and Environments
- Science, Technology, and Society
- Individuals, Groups, and Institutions