

SMASH LAB

Long Range Life Boat

Teacher's Guide



Grade Level: 9-12

Curriculum Focus: Science

Running Time: 40 minutes

Program Description

The Smash Lab team design and engineer a long range lifeboat that could be dropped into the ocean via plane for immediate care in an emergency. The team engineers a boat that will create supercavitation when hitting the water, eliminating g-force. Some design problems the team face include having the boat land horizontally, and if there is enough cavitation to eradicate the impact of landing.

Learning Objectives

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

- Describe how supercavitation protects a boat and eliminates g-force;
 - Understand the importance of research before experimenting;
 - Identify how a control group in an experiment is necessary to collect accurate data;
 - Explain how science experiments drive scientific progress.
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Classroom Connections

What is supercavitation? How does it work? How will it help the boat land safely and smoothly?

In what ways does the team simulate supercavitation? Which way works the best?

How much g-force happens during the final experiment? Is this invention safe?

Why does the team switch from using an airplane to a helicopter?

How does the team get the boat to land horizontally?

Classroom Activities

The key element of cavitation is the formation of an air bubble that rapidly collapses due to the water pressure around it. Many underwater weapons like torpedoes and submarines want to find a way to eliminate supercavitation because the large air bubble makes the watercraft appear on radar. The Smash Lab team simulated bubbles and supercavitation, but is there a way to reverse the process of supercavitation? Students should research air pressure and supercavitation (use <http://www.tech-faq.com/supercavitation.shtml> as a reference) and explore the possible ways of eliminating bubbles in water.

Target Vocabulary*

aerate - to supply or impregnate with air

cavitation - the formation of partial vacuums in a liquid by a swiftly moving solid body or by high-intensity sound waves

trajectory - the curve that a body describes in space

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Academic Standards

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K-12 to promote scientific literacy. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>.

This lesson plan addresses the following national standards:

- Physical science
- Science as inquiry
- Science and technology
- Science in personal and social perspectives