Environmental Science Institute
THE UNIVERSITY OF TEXAS AT AUSTIN

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Junkyard Wars: Wild Watercraft

Revised by Duc Tran, Environmental Science Institute: 10/19/2010
Adapted from "Junkyard Wars: Wild Watercraft" by Ann L. Hammersly, a Physics teacher at Chaparral High School in Scottsdale, Arizona
http://school.discoveryeducation.com/lessonplans/programs/jyw_wildwatercraft/

GRADE LEVEL: 6 – 12th

LENGTH: 1 or 2 class periods

SOURCE: Discovery Education

TEKS

Middle School (Grade: 6 – 8th)

Grade 6: 1A, 1B, 2A, 2B, 2C, 2D, 2E, 3C, 4A, 8C
Grade7: 1A, 1B, 2A, 2B, 2C, 2D, 2E, 3C, 4A
Grade 8: 1A, 1B, 2A, 2B, 2C, 2D, 2E, 3C, 4A

High School (Grade: 9 – 12th)

Grade 9 – 12: 1A, 1B, 2E, 2F, 2J, 3A

OBJECTIVES

1. Develop a hull design that helps boats travel quickly.
2. Test hull design in a class race.

MATERIALS

1. Small battery-powered fan
2. Insulation board (Styrofoam-like product)
3. Modeling clay
4. Water channel
5. Scissors or utility knives

ACTIVITY

The teacher will address the challenge to the students – propose and construct a hull design that will allow their boat to travel faster in the water in comparison to their peers' boats. Divide the class into small groups, and provide each one with the same materials. The only changing variable in this experiment is the hull design. Everything else is controlled, including mass. The mass of all the boats

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must be the same. This can be done by adding modeling clay to the boat, until it reaches the desired mass stated by the teacher. An informal boat race will be held. Record the time for each group's boat as it travels a certain distance in the water channel. Teacher may wish to offer prizes for the fastest times.

DATA COLLECTION

1. Have the students write descriptions and draw pictures of their design.
2. Have students document their time data and distance travel.
3. Have students test their boats for 3 – 5 trials so they can obtain an average speed.
4. Measure the mass of the completed boat (including all its additional parts), before testing it in the water.

CLASS DISCUSSION

Have each group talk about their challenges and discoveries. Have them talk about why they think the boat travel the way it did? Fast or slow?

EVALUATION

Students' work will be evaluated on a basis of 100 points. Students will be graded on their cooperativeness during experiment; participation in class discussion; data collection – descriptions and drawings; responses to questions concerning the activity.

Sample Questions

1. What shape(s) worked best?
2. What did all the fastest boats have in common?
3. What are some important design elements that would be universal to all boats?
4. How do you determine the speed of your boat? What is the speed of your boat?
5. Why was mass kept constant for all boats? What effect does mass have on speed?

VOCABULARY

Hull
Definition: The frame or body of a ship or boat; does not include the masts, yards, sails, and rigging.
Context: From the block of foam, shape your boat's hull.
Mass
Definition: The intrinsic quantity of matter in a body regardless of its volume or of any forces acting on it; an object's resistance to changes in speed or direction of its motion.
Context: The mass of the boat including all its additional parts.
Propel
Definition: To force or move an object forward.
Context: In this experiment, you will use a small battery-powered fan to propel your hull through the water.