CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

33492

Project Title

How Buoyant Is a Plastic Bottle Kayak?

Abstract

Objectives/Goals

Problem - Safebottles.co.nz has reported that more than 100 million plastic water bottles end up in landfills and waterways worldwide each day # that is approximately 1500 every second. There is a need to find ways to reuse these bottles. (http://www.safebottles.co.nz/News/Plastics+and+the+Environment.html).

Objective/goal # My object was to determine is plastic bottles would be buoyant enough to be reused for the construction of a kayak.

Methods/Materials

Methods - researched plastic bottles and the effects on our environment; researched plastic bottle boat and kayak designs; calculated Archimedes Principle; determine which bottles to use; collected materials; designed and built initial prototype for the kayak construction; tested and modified design; final test with person in the boat

Materials - Scale, tub with overflow valve, fresh water, measuring cup, 1# weight, calculator , plastic bottles, glue, caulk, tape, scissors, rope, camera, lifejacket, paddle, wetsuit, bathing suit

Results

The experiment was a success. It produced a kayak that was water tight, floated, and could bear the weight of the experimenter. There was a need to adjust the design three times and there is still room for improvement.

Conclusions/Discussion

Conclusions/discussion - One 24-ounce empty plastic bottle can support 16 ounces or 1 pound of person weight; the lightweight boat was comfortable and sea worthy for a person weighing 100 pounds or less using the 60% rule (www.sansa.org.sa/content/buoyancy-small-vessels); the stern of the boat needs to be expanded to increase stability and change the center of gravity; consider a second row of bottles under the deck or around the gunwales, or redesign the keel and stabilizers to increase stability; the lightweight boat was comfortable and sea worthy for a person weighing 100 pounds or less; the stern of the boat needs to be expanded to increase stability and change the center of gravity; consider a second row of bottles under the deck or around the gunwales, or redesign the keel and stabilizers to increase stability

Recommendations - Although the project was a success, there is a need to adjust the design and construction of the boat.

Summary Statement

This experiment has shown that with some design modifications this project can be replicated by many people allowing for the reuse of plastic bottles that will no longer go into the oceans or landfills.

Help Received

Parents and sister helped collect bottles and with the construction of the boat. Mother helped with typing and graphs. Guidance and support received from Paul Pakus and Norman Negus

Preliminary