

## The Great 9th Grade Odyssey

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Students worked in groups of three or four to create boats made solely out of cardboard and packing tape. These boats were 6 feet by 4 feet (or larger) and two or more people from each group would set sail in them in the bay. For six weeks students explored the concepts of buoyancy, density, volume, and mass, and how engineering design and scaled drawings could be applied to further their understanding. They built one-eighth scaled models of their designs, tested their models, and then revised their designs on paper before embarking on a week of building their full-scale boats. The project concluded with a daylong exhibition where students showcased their learning of the concepts through demonstrations and displays, and then put their boats to the ultimate test as they sailed away in the bay.

### Teacher Reflection:

For two weeks during building, my students continually told me that there was no way that this would work. They didn't even believe me when I showed them pictures of people in cardboard boats. They especially didn't believe me when I told them to check their calculations—they just figured that they did something wrong. They weren't convinced until race day was upon us, and they pushed their boats out into the water for the first time. There was this magical moment and transformation that happened when they truly understood what those calculations and drawings represented. Figuring out the required volume for their boat was meaningless unless they could take those calculations and build a boat they could actually sail. What was even better was that these boats seemed to defy all odds, proving to the students that even when it doesn't seem possible, there is always a way.

### Student Reflection:

This was my favorite physics project I've ever done. I really enjoyed learning about density and buoyancy and all of the factors that go into things that float because it gave me a better understanding of how things around me work. It was awesome that we got to design and build our own boats using the information we learned. Testing and racing our boats in the bay was a really fun way to celebrate the end of the project.

—Agustin