

“Doubt is the father of invention.”  
Galileo Galilei



WATER, WATER EVERYWHERE

June 2009

May 2009

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July 2009

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6 SAT Test and Subject Tests Date
7	8	9	10	11 Jacques Cousteau's Birthday	12	13 ACT Test Date
14 Flag Day	15	16	17	18	19 Juneteenth	20
21 Father's Day	22	23	24	25	26	27
28	29	30	<b>Ocean Biology Question</b> — Which of the following is NOT a typical vector for the introduction of aquatic invasive species? W) Ballast water exchange, X) The home aquarium industry, Y) Aquaculture, Z) Drinking water treatment systems			

A: Z) Drinking water treatment systems

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While a Professor of Math at the University of Padua, Galileo often visited the Arsenal, the inner harbor where ships were fitted out. There, he learned a great deal about shipbuilding technology. In 1593, the shipmen faced a problem involving the placement of the oars in the galleys. Galileo was asked to examine the issue and submit a report. In his report, he tackled the problem by treating the oars as levers and made the water the fulcrum. One year later, the Venetian Senate awarded him a patent for the pump, which was powered by one horse.

Today, ships are equipped with pumps of all different types depending on the ship's needs, ranging from 20 pumps on board to hundreds. Uses for pumps included pumping water off or on the ship, maintaining output pressure, or maintaining the temperature of the fluid aboard. Often, water is carried on large ships to provide stability, balance, and weight. This water is pumped on board before the ship leaves port, and pumped off when the ship arrives at its destination. Along with the water, small marine species are often pumped on and off the ship, too. It has been estimated that up to 1,000 marine species are being carried around the world every day. This provides an unnatural mechanism for moving marine species around the globe, where some establish new populations in the surrounding waters. These species are called invasive species.

Eighty-four percent of the world's marine ecosystems have been affected by invasive species. San Francisco Bay is one of the most heavily impacted waterways in the world. The invasion of non-native species can cause irreversible disruption to ecosystems—commercial, agriculture, and recreational. They can displace native species, change food webs, disrupt fisheries, and impact humans and their well being. One economic report suggests that invasive species cost the United States more than \$100 billion a year and impact nearly half of the entire species listed as endangered or threatened.

Credits: Ship emptying water courtesy of <http://www.indexopen.com>; Zebra Mussels (thumbnail) courtesy of <http://www.wikipedia.org>; Zebra mussel illustrated (below) courtesy of Gina Mike, <http://www.scientificillustrator.com>