

## Math & 107

### Project 1: Global Warming and Greenland

Greenland (Greenlandic: “Kalaallit Nunaat”), is a self-governing Danish province located between the Arctic and Atlantic Oceans. Though geographically and ethnically an Arctic island nation associated with the continent of North America, Greenland is closely tied to Europe, specifically Iceland, Norway and Denmark. It is the largest island in the world that is not also considered a continent.

Most of Greenland is covered by an ice sheet. According to Wikipedia, the total area covered by ice is about 1.7 million square kilometers. The average thickness of ice on Greenland is about 1600 meters. In the summertime Greenland loses part of its ice sheet.

“On Aug. 8 2012, the Greenland ice sheet shattered a seasonal record, with more cumulative melting since record-keeping began more than three decades ago, new research finds. Greenland's melting season usually begins in June, when the first puddles of meltwater emerge, and lasts through early September, when temperatures begin to cool. This year, a full four weeks before the end of the melt season, the ice sheet had shed more water than the record reached during the full season in 2010. "With more yet to come in August, this year's overall melting will fall way above the old records. That's a Goliath year — the greatest melt since satellite recording began in 1979," said study researcher Marco Tedesco, assistant professor of Earth and atmospheric sciences at The City College of New York.”

Your job on this project is to use the information above to determine the following

- The total volume of the ice sheet in Greenland
- What volume (in gallons) of liquid water would this represent? When glacier ice melts, the resulting volume of water is about 90% of the original volume of ice.
- Assuming all of this water melted and flowed into the world's oceans and assume the oceans stay in the same basin rather than spread out over the continents, how much would sea level rise? Give your answer in kilometer, meters and feet. Also report how much of a percentage increase this would be in total volume of the world's oceans.
- There are many different models that try to estimate how long (under current conditions) it would take before Greenland was ice free. Many estimates come in around 1000 years. Assuming that the Greenland ice sheet is melting at a constant rate and will be gone in 1000 years, if you owned a home that was on the coast 2.4 meters above current sea level, how long would it take before the water reached your doorstep?

Write up your findings in a well written report. You should include an introduction to the problem, show and explain all of your calculations as well as cite your sources. Make sure you include answers to each of the questions and an overall conclusion.