Middle School Awards:

Region VI: Boston
Honorable Mention to:

George Lok, Boston Latin School, Boston

"A Model of Boston's Tidal Wave Content"

My name is George Lok. I am in eighth grade and I go to Boston Latin School at Avenue Louis Pasteur in Boston. My favorite subjects are Math and Science. In addition, I am on my school's swimming team. I like to read, draw, do basic programming and play games but mostly, I like to learn something new. I enjoy doing mathematics. I often do Sudoku and math puzzles.

I am very fond of understanding the nature of things. When I do not know how certain things work, I will visit the web site, www.howstuffworks.com to find out what makes it work. I still do not know a lot of things, but I try.

My new science project is another example of my ideal science. The title of my project is "A Model of Boston's Tidal Wave Energy Content." Our planet will have the illness of global warming if we do not use clean energy. One thing I like most is to find a scientific solution that will make people live a better life. Science is good if it can help us or heal us when we are sick. I also joined the MIT STEM (Science, Technology, Engineering, Mathematics) mentoring program. I am interested in either becoming a medical doctor, a computer programmer, or a medical engineer.

MY PROJECT:

The purpose of my project was to find out if the energy needs of Boston could be supplied by a tidal wave energy project on the entire Boston coastline. The project is only intended to give preliminary results. It does not put into account pollution, economy, ships, animals, accidents, and weather, to name a few of the possible variables.

I put two aquariums together, aquarium A and aquarium B. Aquarium A was constantly filled to the rim with water. Aquarium B was empty, but it had measurements to show water level. I used an aquarium water pump to transfer water from A to B. I recorded the time it took to fill B, the voltage, and the current. Whenever the water level increased in height in Aquarium B by 5cm, I would record the time, the voltage, and the current. I would repeat every 5 cm until the water reached the 35 cm mark.

My results were interesting. I found out that the relationship between potential energy and the pump energy is a linear one. Half of the Massachusetts 1500 km coastline lies around Boston coastline from North Shore to South Shore. The tidal wave difference between the high and low tides in a twelve-hour cycle averages about 2.644 m. Assuming that the width of the tidal basin is 100 m, we would have 85.74 thousand mega watt hours [or 85.74 Giga-Watt Hours (GWhr)] generated from the tidal wave in a month. The net electrical energy generated monthly by the entire state of Massachusetts is 3,963 GWhr, and half of it is used to service the Greater Boston area. Although the amount of tidal wave generated electricity would not be able to satisfy the monthly electrical consumption of Boston, it would be quite high when compared with the other renewable energy sources.