

# RST countdown

FALL 2011

**Rocket science tutors**  
www.rocketsciencetutors.com

*Rocket Science Tutors is a volunteer, non-profit 501 c-3 organization dedicated to improving math and science education. See our website for more information.*

**It has been a very busy year at RST! Some of the significant events were:**

- *Operated at four Santa Ana Middle Schools from October-April*
- *Partnered with Boys & Girls Club and funded by Time Warner Cable to add new schools*
- *Finished with ~150 rocket builds & launches*
- *Hosted a field trip to UCI engineering labs for 115 RST students*
- *Added Optics, Electromagnetism labs & demos*

## **Six Years, Four Schools**

This April, RST completed its 6<sup>th</sup> year of after school programs, bringing STEM excitement to four middle schools in the Santa Ana Unified School District: McFadden, MacArthur, Sierra and Mendez. This expansion was made possible by our generous sponsors, in particular Time Warner Cable. For the 2010/2011 school year, RST provided a weekly technical session at each of four schools, culminating in a rocket launch by each of the roughly 150 students enrolled in the program.

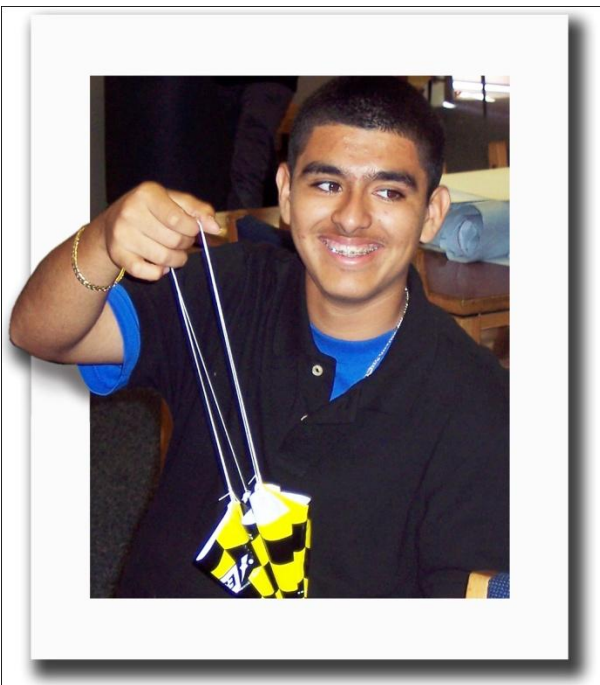


## **UCI Connection**

The number of RST's volunteers has reached 40- many of whom are engineering graduate students at the University of California, Irvine. Their enthusiasm and subject matter knowledge have greatly enhanced RST effectiveness. Thanks!

Be sure to visit our upgraded website at

[www.rocketsciencetutors.com](http://www.rocketsciencetutors.com)  
which now includes a PayPal link for donations.



## **Rocket Launches**

The major event ending the RST school year was the rocket launch in April. Each year, all RST students build and launch their own chemically powered rocket. In doing this, Newton's Laws are reinforced along with assembly skills and attention to detail needed for a successful launch. This year, 155 students experienced the thrill of flying a rocket they built themselves. In addition to the flight, students learned how to calculate the height attained (using a little trigonometry) as well as the average speed.



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## Frightening Fact

About one-third of all jobs in the United States require science or technology competency, but currently only 17 percent of Americans graduate with science or technology majors ... in China, fully 52 percent of college degrees awarded are in science and technology. (William R. Brody, president of Johns Hopkins University, Congressional testimony July 2005)

## Science Night at MacArthur Fundamental

On June 1<sup>st</sup>, RST participated in "Science Night" at MacArthur Fundamental School, bringing the "Bouncing Polymers" lab to students along with their parents. In this lab, various ratios of compounds are mixed creating polymers with various physical properties.



## RST Quick Facts

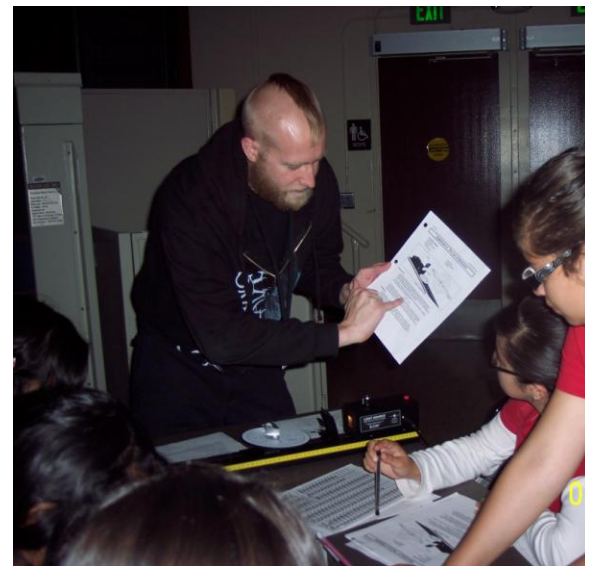
- RST completed its 6<sup>th</sup> year of after school STEM programs in Santa Ana
- RST uses "live" engineers in the classroom with a very low engineer/student ratio
- RST conducts a 24-week after school STEM program emphasizing the connection between Math and Science
- RST is an all-volunteer 501C-3 organization comprised of working & retired engineers and engineering graduate school students
- RST provides its program at no cost to the schools

## THRUST FOR AMERICA'S FUTURE

### New Labs

Several new labs were added this year, expanding the experiences provided to students. Examples are:

**Optics-** Students at McFadden were able to get "up close and personal" with light and measure the incidence of refraction. This lab was made possible by a loan of optics tables from Brian Monacelli of Irvine Valley College/Advanced Technology and Education Park



### Air Pressure

Several experiments/calculations involving air pressure demonstrated the force of air pressure. For example, students experienced and calculated the force exerted by suction cups, performed an experiment with Bernoulli's Law and computed the weight of the air occupying the classroom (it was a LOT more than they had guessed).



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## Boys and Girls Club

Another significant development was RST partnering with the Boys and Girls Club of Santa Ana, allowing RST to add Mendez and Sierra Schools. Below is an excerpt from Boys and Girls "E-News" October 2010:

SANTA ANA, Calif. - The Boys & Girls Club of Santa Ana welcomed Sierra Preparatory Academy as its seventh officially chartered site on Friday, October 8, 2010.

As part of the expansion to Sierra, the Club also welcomes Rocket Science Tutors, a new partner that will run 24-week STEM programs at Mendez Fundamental and at Sierra during the 2010-11 school year.

"Rocket Science Tutors is very excited to have partnered with the Boys & Girls Club of Santa Ana, adding Sierra and Mendez Intermediate Schools to those we currently operate at in the Santa Ana Unified School District," said Nino Polizzi, President of Rocket Science Tutors. "Our complementary capabilities will increase the impact our organizations have on Santa Ana students."

All supplies for the Mendez and Sierra locations were funded by Time Warner Cable.

"We are excited about the partnership with the Boys & Girls Club of Santa Ana and bringing the Rocket Science Tutors program to more Santa Ana schools," said John M. Borack, Time Warner Cable Director of Community Affairs. "Connecting local kids to after-school opportunities such as this slots in perfectly with Time Warner Cable's Connect a Million Minds philanthropic initiative, which is designed to inspire students to pursue learning opportunities and careers in science, technology, engineering and math."

## ASAT Conference

On May 21, RST presented "Igniting STEM Interest In Middle School" at AIAA Orange County Section's ASAT Conference in Santa Ana. This forum provides an opportunity for RST to network with the technical community.



## Connect a Million Minds Global Town Hall

RST hosted Time Warner Cable's "Connect A Million Minds Global Town Hall" in November, held at Masuda School in Fountain Valley.



## UCI Field Trip

For the second year, RST funded and organized an interactive tour of the University of California, Irvine (UCI) Biomedical Engineering Labs. These labs are where many of our UCI RST volunteers conduct their research. RST students were able to see first-hand what goes on inside a research lab, see several amazing demonstrations and in some cases, participate in an experiment. Some highlights were:

**Laser Lab** RST students learned about the unique properties of laser light and how scientists and engineers safely use lasers in a medical setting. Students learned about the unique properties of laser light and how scientists and engineers can safely use lasers in a medical setting



### Re-cellularizing Cardiac ECM

RST students were given a general overview of the goals of tissue engineering. They then performed a hands on comparison of normal heart tissue and the cardiac ECM obtained by de-cellularization (ie removing the cells from the heart). The demonstration finished by discussing the significance and procedure of re-cellularizing that ECM with cells for use in the medical field.

**Microfluidics** the movement of small amounts of fluids- is a key area of research at UCI. Students toured several labs where they observed how poly-dimethyl siloxane (PDMS), a commonly used elastomer in microfluidics, is made and learned about plasma bonding. They were able to learn the concept of laminar flow by placing different colors of food dye into devices and watching the colors flow next to each other



**Cell Biology** Students learned that studying cell biology can help with understanding how diseases begin and affect our bodies, and how we can come up with cures to these diseases. They were able to look at their own skin cells under a microscope and take a picture of their cells home with them.



**Ultrafast Spectroscopy Lab** Learn about the size and time scale of molecular motion. Observe a scanning tunneling microscope (STM) used to record images of molecules and atoms.



**Brain Computer Interface** RST students watched a live demonstration of a Brain-Computer Interface in which changes in electroencephalography (EEG) of the brain were measured and mathematically analyzed, allowing the researcher to communicate messages directly from the brain to the computer!



**Thanks to our sponsors:**



AIAA Orange County Section | Universal Space Network  
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