

## Marsh White Award Final Report

Drexel University – May 2009

This past year, the Drexel University chapter of the Society of Physics Students teamed up with a local middle school to create a physics-based after-school program. Beginning November 2008, members from our chapter, that included both physics and non-physics majors, visited Independence Charter School (ICS) in Center City Philadelphia on a bi-weekly basis to teach a class of about 25 very enthusiastic middle school students about topics in physics that they normally would not have encountered in a regular science curriculum. We developed our teaching modules while working closely with their science teacher and administrators. At each meeting, between 3-6 SPS members presented a different topic through mini-lectures and demonstrations. Students were then split into groups so that they can be actively engaged through hands-on experience with our demonstrations. We covered topics that spanned mechanics, electricity and magnetism, and even a little special relativity! These demonstrations lasted typically for two hours. During one week, we performed joint thermodynamics demonstrations with Drexel's American Chemical Society. The students really enjoyed learning and loved exploring physics through our demonstrations.

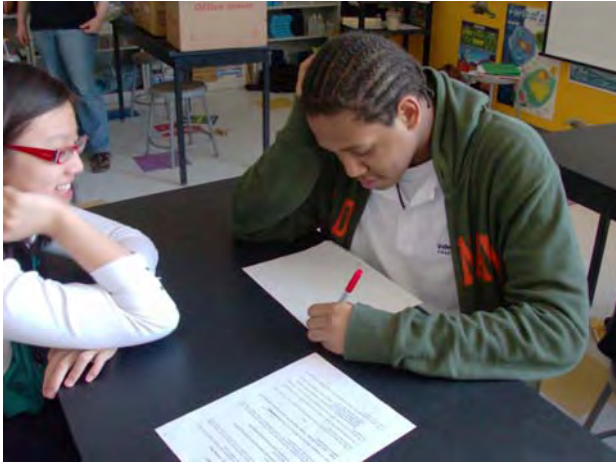
To provide a capstone activity to the program, we challenged the middle school students to build a Rube Goldberg machine. We broke the class up into nine groups of two to three students and asked them to build a machine that would ultimately perform one function: knock a ball into a cup. Each machine was required to have at least five steps and use as many of the different topics we discussed throughout the year as possible. The majority of the building materials came from a "junk drive" we held within Drexel's physics department so students had a wide variety of objects to work with. Donated materials ranged from scraps of balsa wood to pieces of sprinkler pipes, from floppy disks to a busted fan. During the building process that began around March 2009, SPS members visited ICS *every week* to help students. We tried to guide the students through the design and building process without hindering their creativity. The goal of the project was not just to build Rube Goldberg Machines but to allow the students to demonstrate what they have learned during our program.

In order for the students to showcase their projects, SPS held a Rube Goldberg competition on Tuesday, May 26, 2009 from 12-3 pm, at the Grand Behrakis Hall, in the Student Center of Drexel University. We invited students and their teachers from ICS to our campus and opened the event to Drexel students, faculty and staff members. The machines were judged by four physics professors and a number of University employees who showed interest in the exhibit. To give the students extra excitement, we formed a "Drexel SPS" team that built its own Rube Goldberg machine, both to "compete" with the students' projects and, more importantly, show the students what they could accomplish as future scientists. Everyone had a great day as students from ICS presented their projects to faculty and university students from various disciplines. For refreshments, we ordered pizza, drinks and made popcorn from a popcorn machine that SPS rented. Photos of the different teams and their machines were taken while videos were taken of the machines in action. ICS students were also interviewed on-camera. Many of these photos are already posted online and can be found at: [http://www.physics.drexel.edu/students/organizations/sps/?page=album&album=2009.05.26\\_RubeGoldbergCompetition](http://www.physics.drexel.edu/students/organizations/sps/?page=album&album=2009.05.26_RubeGoldbergCompetition). The competition was the perfect ending to our seven-month-long program. We look forward to running a similar program in collaboration with ICS again for the 2009-2010 school year.

**Expenditures:**

Materials from junk drop	\$0
Miscellaneous building supplies (Hot glue, duct tape, etc.)	\$30
Food for Rube Goldberg event (Pizza, Soda, Popcorn)	\$180
Room reservation for event	\$70
Physics Themed Prizes and Medals	\$65
Total	\$345
Award	-\$300
Additional Funding	-\$45
Balance	\$0.0

## Photos from the Rube Goldberg Project



ICS students working on their Rube Goldberg blueprints



SPS member Alyssa Wilson works with students on their design.



SPS member Wendy Harris works with ICS student



ICS students work on building their Rube Goldberg machines.





Students prepare their machines before the judges arrive



A demonstration of a Rube Goldberg for Drexel students and a judge



SPS Director of Outreach Alyssa Wilson with competition winners and 1<sup>st</sup> and 2<sup>nd</sup> runner ups