

## **This IS Rocket Science!**

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In August, five students from Lake Arthur High began an endeavor to become Rocket Scientists via the Systems-Go New Mexico Rocket Program. Students learned scientific techniques, technological application, engineering practices, and mathematical skills (STEM). Culminating in an understanding the Jet Propulsion Lab at NASA would be proud of.

Ultimately, they have but one goal, design and build a sounding rocket to propel a one pound payload one mile into the atmosphere. Sounds simple, until the realization of force, thrust, impulse, fluid friction, and design limitations hits. Students must use out of the box thinking, and teamwork to have a vehicle ready for launch day. Their hybrid motor produces 65 lbs. of thrust for about 6 seconds. After 6 seconds, momentum takes over to fight gravity, and friction.

Students labored with a plague of setbacks during small-scale testing. From failures in launch equipment, to erratic flight dynamics. Each problem offering an opportunity to put their new-found knowledge of STEM to use. Attaining, at each step, a better understanding of practices and problem-solving techniques. Students adapted and overcame each obstacle and succeeded in testing. These tests were a stepping stone to the main rocket build.

Students put all this to good use by designing a sounding rocket in simulation software. The software allowed different design components to be tested and mocked together without buying each and trying it for real. After a few weeks, students had designed a rocket to meet all major parameters save one. It was not reaching the 5,280' height requirement. Engineering and physics concepts were put into play to configure the rocket for proper altitude. The reality is that  $v = \sqrt{2Gh}$  simply put height is proportional to velocity. The faster the vehicle goes the higher is goes. With this knowledge, students could decrease friction and weight, to increase speed. Eureka! One mile simulation achieved. Now comes the real challenging and fun part, the actual build. Working together they will build a 25-pound rocket measuring seven-foot-long, and three-inches in diameter.

Thanks to a grant for funding from the GEAR UP Program at ENMU-R, students purchased all the needed materials to build their experimental vehicle. As they anxiously await the delivery of their materials, they are actively preparing for the large-scale build. Most notably determining how to mount the payload. A video camera is being used as a payload to provide video data of flight dynamics for use during post-mission analysis. With any luck, no rocket surgery will be required before launch.

On April 27<sup>th</sup>, their vehicle will be put to the test in a live launch, from Jal, NM. Rockets from across Southeast New Mexico will fly. The launch site has been set and prepared, FAA has been contacted and approval received. The area will be a no-fly zone on the day of launch to ensure aircraft safety.  $NO_2$  and gaseous  $O_2$  have been procured to provide an oxidizer for better burning of the solid rocket fuel. In the end its All Systems Go for Lake Artur Rocket Sciences!