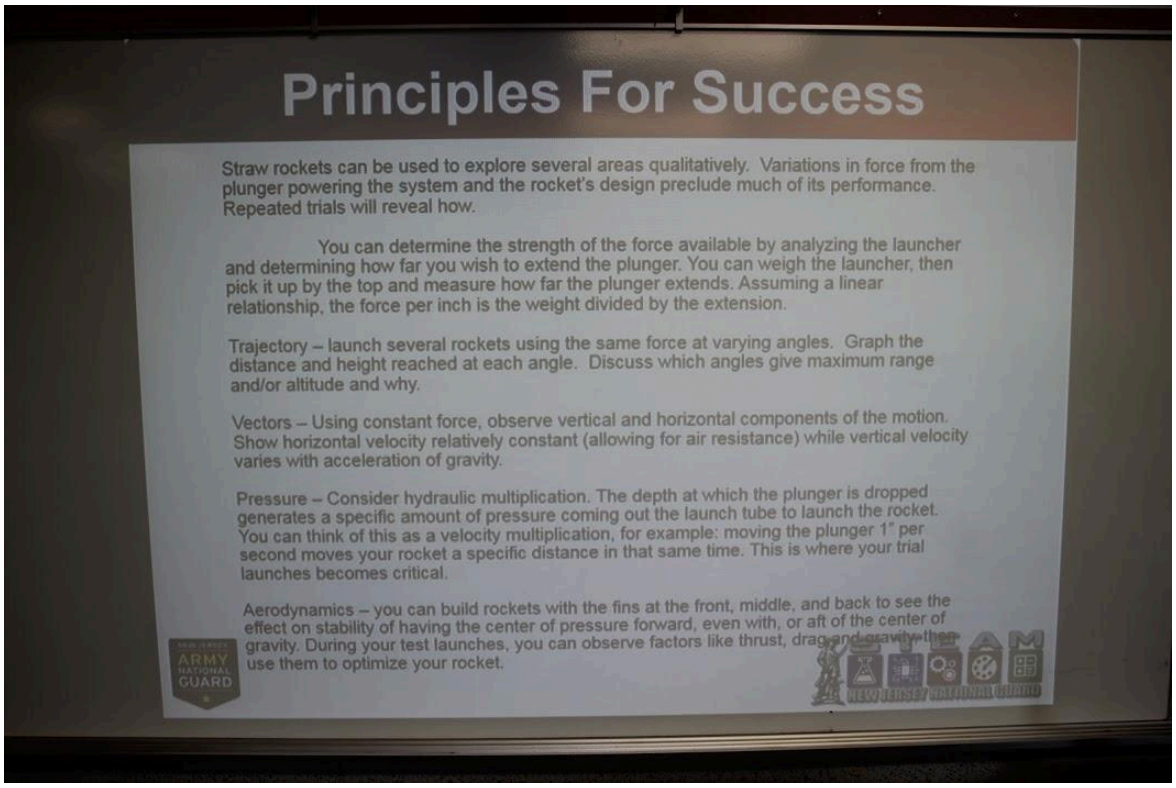
Army STEAM comes to High School East



March 11, 2020: The New Jersey Army National Guard made a guest appearance at High School East Robotics and Rocketry Club's for their March meeting. SSG. Simonetti and SSG. Fulmer are a part of the Army National Guard's Student Achievement STEAM Program where students learn to apply aeronautical concepts to design rockets out of straws and playdough. The students then test out their designs on an air pressured launch platform. The competition was fierce but friendly as the student's rockets were judged for distance and accuracy. Many students were able to make changes on their rocket's design in which many improved their performance. Thank you to the New Jersey National Guard Student Achievement STEAM Program.


Principles For Success
Straw rockets can be used to explore several areas qualitatively. Variations in force from the plunger powering the system and the rocket's design preclude much of its performance. Repeated trials will reveal how.
You can determine the strength of the force available by analyzing the launcher and determining how far you wish to extend the plunger. You can weigh the launcher, then pick it up by the top and measure how far the plunger extends. Assuming a linear relationship, the force per inch is the weight divided by the extension.
Trajectory – launch several rockets using the same force at varying angles. Graph the distance and height reached at each angle. Discuss which angles give maximum range and/or altitude and why.
Vectors – Using constant force, observe vertical and horizontal components of the motion. Show horizontal velocity relatively constant (allowing for air resistance) while vertical velocity varies with acceleration of gravity.
Pressure – Consider hydraulic multiplication. The depth at which the plunger is dropped generates a specific amount of pressure coming out the launch tube to launch the rocket. You can think of this as a velocity multiplication, for example: moving the plunger 1" per second moves your rocket a specific distance in that same time. This is where your trial launches becomes critical.
Aerodynamics – you can build rockets with the fins at the front, middle, and back to see the effect on stability of having the center of pressure forward, even with, or aft of the center of gravity. During your test launches, you can observe factors like thrust, drag, and gravity, then use them to optimize your rocket.
ARMY NATIONAL GUARD
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Principles For Success


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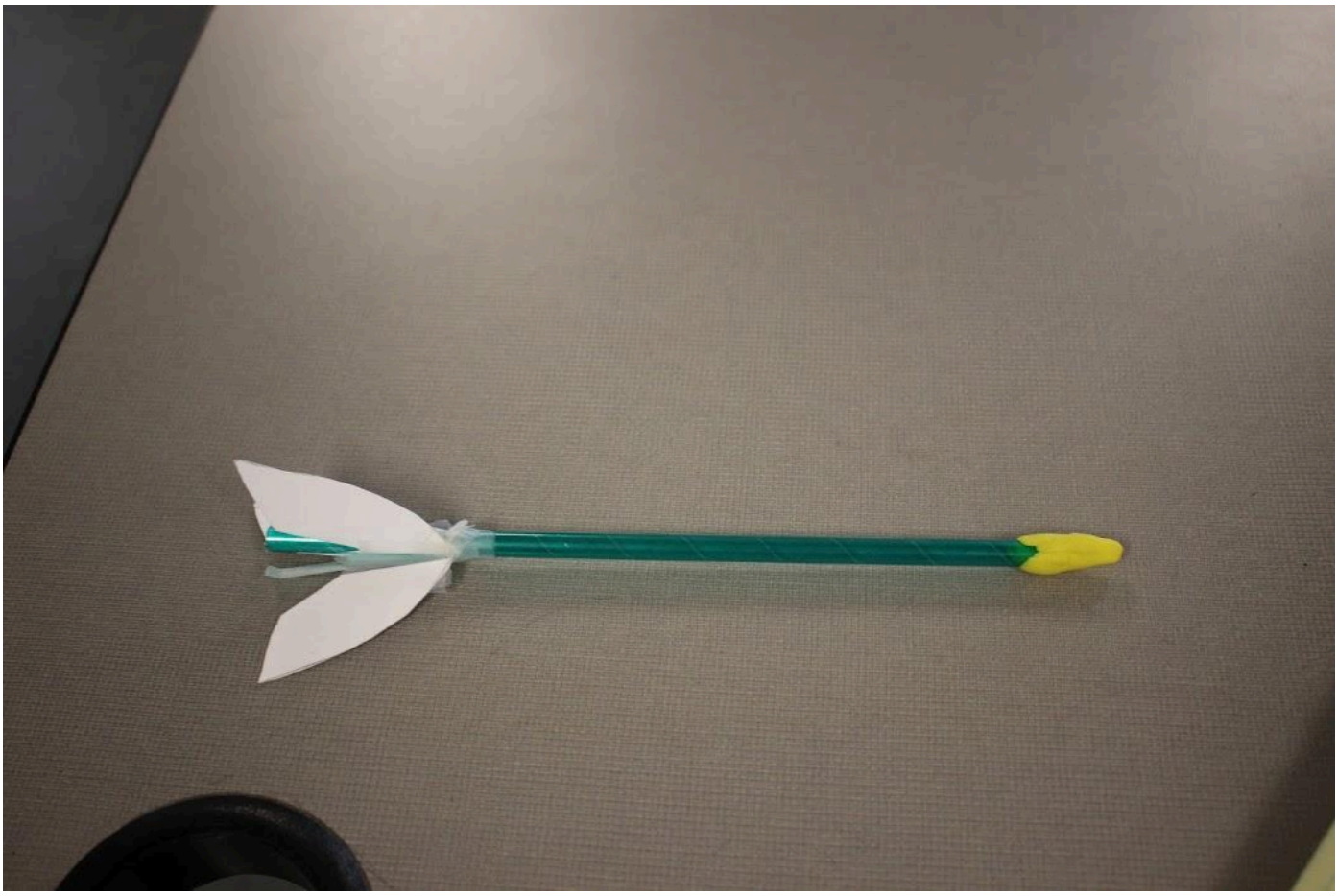





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