Rockets: Lab #7
By M.L. West

Objective: to investigate projectile motion and the forces which propel rockets.

Equipment: Hand bulb foam rocket, Alka Seltzer, white film canister, small graduated cylinder, Stomp Rocket, White Rushin, construction paper, transparent tape, colored markers, pennies, balance, long tape measure, double meter stick, stop watch, target, scissors, large protractor

Background: Definition in sketch and equation
Minimum Vertical Height:
Horizontal Range:

Procedure: There is a range of equipment available, some with multiple copies and others unique, so share nicely. Be careful of the safety of other people at all times. Some experiments are to be done outside.

Investigations: Each lab team is to plan to investigate several of these themes:
   Horizontal range as a function of angle of launch
   Horizontal range as a function of mass
   Maximum height (vertical range) as a function of mass
   Vertical or horizontal range as a function of amount of chemical fuel
   Vertical or horizontal range as a function of amount of water
   Vertical or horizontal range as a function of condition of chemical fuel (surface area)
   Vertical or horizontal range as a function of temperature of water
For each theme please plan three or four values of the independent variable. Repeat each measurement several times.
Each lab team should experiment in some way with the three types of rockets:
   Hand bulb foam rocket
   Alka Seltzer film canister rocket outside (half a tablet, 5 milliliters water to start with)
   Larger rockets: Stomp Rocket, White Rushin, Silver Slingshot, etc.

Analysis: Make graphs of your data. Use a linear trendline (label axes, display equation, R^2 value)

Contests:
1. Maximum height for a hand rocket
2. Maximum height for a film canister rocket
3. Maximum horizontal range for a hand rocket
4. Maximum horizontal range for a film canister rocket
5. Longest accurate shot for a large rocket (Can you get it into a horizontal bucket from 3 m?)
6. Artistic merit (due next week)

A group report is due next week, including list of equipment, sketches, graphs, comparison of experiments to theory, conclusions, and applications to space programs.