

# **Bottle Rocket Experiments**

Materials:

- Rocket Launcher
- 2 Liter plastic pop bottle (minimum of 11)
- 160 grams of hardware such as washer or nuts
- Timer
- Altitude Tracker
- Tire pump or Air compressor
- Various tapes such as packing tape or duct tape
- Scissors

Spreadsheet Construction

Using Excel, construct a spreadsheet similar to the following to record launch data.

Launch #	Water (mL)	Air (psi)	Nose Wt (g)	Time (sec)	Altitude	Velocity
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

Enter the following data in the spreadsheet:

- Launch Bottles 1, 2, 3 with 0 mL water, 0 nose wt., and 40, 60, 80 psi air.
- Launch Bottles 4, 5, 6 with 500 mL water, 0 nose wt., and 40, 60, 80 psi air.
- Launch Bottles 7, 8, 9 with 750 mL water, 0 nose wt., and 40, 60, 80 psi air
- Launch Bottles 10, 11 with 500 mL water, 60, 80 nose wt., and 60 psi air.

Launch of Rockets

Assign 2 students to record the altitude using the Altitude Tracker and 1 to time. Launch the bottles and record the times from blast off until they hit the ground.

As a class, calculate the velocity of the first two or three launches using the correct formula.

Assign the rest of the launches to pairs of students. Always make sure you have a timer and two trackers.

Use the TI 84 to make a graph and compare the height with the air and water amounts.

Identify each law in the launch of the rocket in a class discussion.

Students build their own rockets by adding fins and attachments. Use recorded data to decide which weight, air and water ratio works best.

Allow students to launch at least twice changing only one variable at a time. Record times and height in a new spreadsheet. Calculate the velocity as well as complete a graph of their launches.

Hold a final competition with one launch of their favorite design.

