

Dynamic Design: Launch and Propulsion

Altitude vs. Water Pressure

STUDENT ACTIVITY

PROCEDURE

Problem: What launch pressure will make the 2-liter bottle go to the specified height (30 meters)? Remember that right now you are testing for launch pressure, all other variables (including volume of water) should remain constant.

Background: Research additional information on Newton's Three Laws of motion as they relate to the force necessary to lift the bottle off of the launch pad to a height of 30 meters. Include in your reading concepts related to force (balanced and unbalanced), motion, mass, thrust, lift, acceleration, propellant, center of mass, roll, pitch, yaw, center of pressure and make notes. The content background section in the teacher's guide will assist you as well as some of the web sites listed in the bibliography of this unit.



Procedure:

- 1. Put one bottle at a time on the launch pad and apply the pre-determined amount of pressure.
2. Have an altitude tracker spotter positioned at each of the four positions (north, east, south, and west).
3. Each spotter will use the altitude tracker to measure the angle of the highest point of flight.
4. Each angle should be recorded; the high and low angles should be omitted.
5. Two more trials should be made for that launch pressure.
6. Average the six angles to come up with an average angle.
7. Use the conversion chart to identify the height.
8. Repeat the same procedure for the other launch pressures.
9. Graph your results and write your conclusion.



Data:

Air Pressure (psi)	Trial 1 Angles (degrees)	Trial 2 Angles (degrees)	Trial 3 Angles (degrees)	Average Angle (degrees)	Average Height (meters)
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		
	N - E - S - W -	N - E - S - W -	N - E - S - W -		



Results:

(Graph Altitude vs. Launch Pressure)

Conclusion: What did you discover about launch pressure during your tests? Support your conclusion with data.