

Dynamic Design: Launch and Propulsion

Altitude vs. Water Volume

STUDENT ACTIVITY

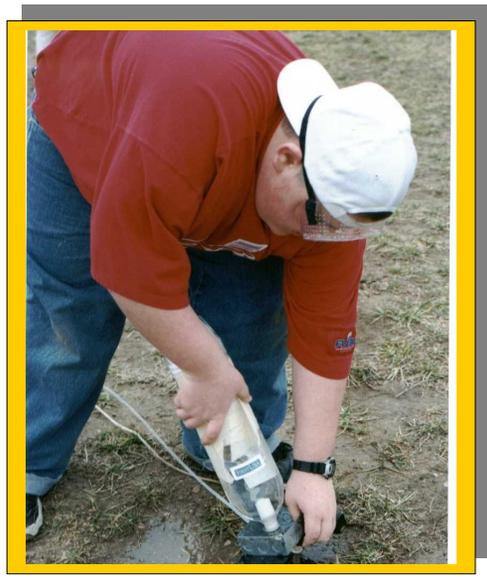
PROCEDURE

Problem:

How much water should be added to the 2-liter bottle to make it go the highest? Remember that right now you are testing for volume of water, all other variables (including launch pressure) should remain constant.

Background:

Research information on Rocket Principles (pages 13-17) and Practical Rocketry (pages 18-24) from NASA's Rockets: A Teacher's Guide with Activities in Science, Mathematics, and Technology, or go to some of the Web sites listed in the bibliography and make appropriate notes.



Procedure:

1. Fill bottles with pre-determined volumes of water and cap bottles.
2. Put one bottle at a time on the launch pad and apply 50 psi of pressure.
3. Use a compass to determine locations. Have an altitude tracker spotter positioned at each of these four positions (north, east, south, and west).
4. Each spotter will use the altitude tracker to measure the angle of the highest point of flight.
5. Each angle should be recorded; the high and low angles should be omitted.
6. Two more trials should be made for that volume of water.
7. Average the six angles to come up with an average angle.
8. Use the conversion chart to determine the height.
9. Repeat the same procedure for the other volumes of water.
10. Graph your results.
11. Write your conclusion.



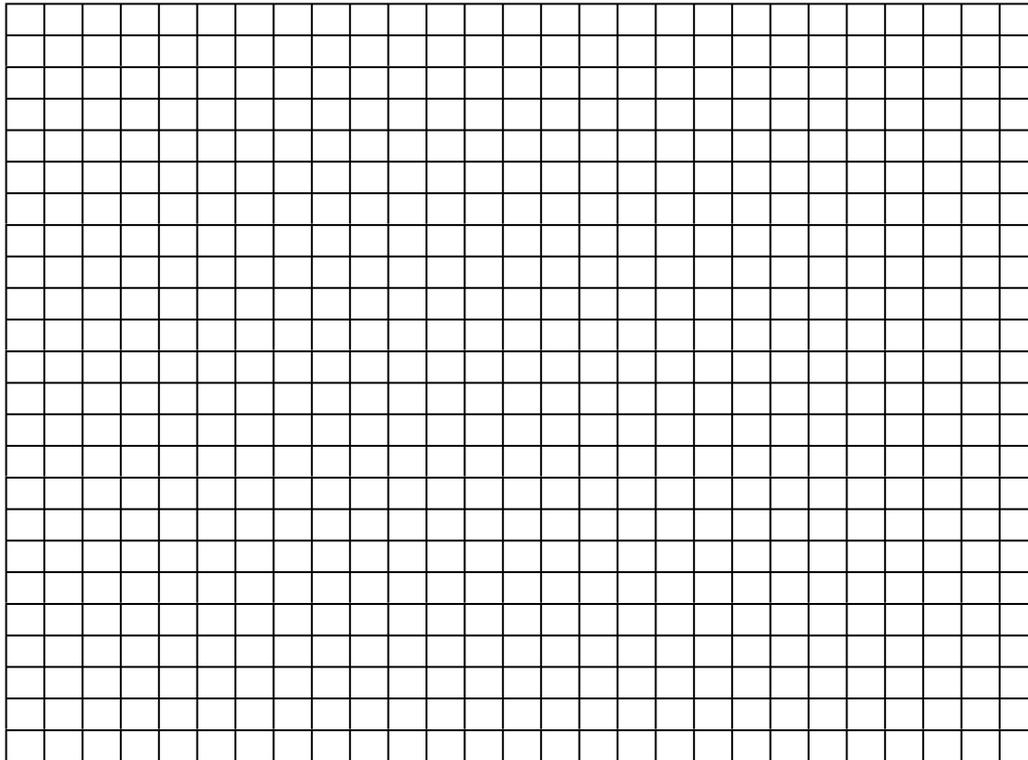
Data:

Volume of Water (mL)	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. Volume of Water)



Conclusion:

What did you determine was the optimum volume of water to meet the specifications for your flight? Support your decision with data that you collected.