

Physics Design Competition

“Blast Off!”

In this competition lab, you will design and build a rocket. The goal is to have your rocket travel the highest. Using some calculations, you will calculate the final velocity of your rocket (the velocity it is traveling once the engine stops).

Rules

- 1) You are allowed only one engine to power your rocket. You may use whatever other materials you desire.
- 2) You are only allowed two hot glue sticks. If you waste them, you will have to find something else to assemble to rocket.
- 3) Your rocket must be ready to go on the day of the launch. Any rockets not finished will get a zero for the performance part of the competition.

Materials and Procedures

The materials and procedures will be given to you in a separate handout. There are several different fin shapes you can use, or you can design your own. I will provide paper towel rolls, but you may use some other cylindrical object if you prefer for the rocket body.

Grading

40 points – Pre and post lab questions

All questions must be answered, and if your rocket does not travel higher than 100 m, you must give an analysis of what went wrong and how to fix it

30 points – Calculations

All calculations must be done with work shown and important numbers circled.

30 Points – Performance

Rocket travels 100 m or more,
parachute successful – 30 pts.

Rocket travels 100 m or more,
parachute unsuccessful – 20 pts.

Rocket travels 100 m or less – 10 pts.

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Pre-Lab Questions

- 1) Describe some factors that may affect how high a rocket can go.
- 2) Draw a free-body diagram of a rocket as it lifts off from a launch pad. Make sure to label all forces.
- 3) Draw a position vs. time graph for a rocket that accelerates upwards for 4 seconds, reaches a constant velocity and travels that fast for another 4 seconds, stops at its highest point, and parachutes back down to Earth at a constant velocity for 10 seconds.

