

Stomp Rockets

Name: _____

Date: _____

Lesson Focus

This lesson focuses on the concept of three of the four forces of flight (thrust, drag, and gravity) and how changes in design can affect performance.

This lesson also covers Newton's third law of motion, which states that for every action (force), there is an equal and opposite reaction.

Materials

1. Rocket body
2. Fins from template worksheet (paper or card stock)
3. Cotton ball
4. Scotch tape
5. Markers

Pre-Lab Questions: Please use complete sentences with correct punctuation.

1. What are Newton's three laws of motion? Write them down or look them up.

2. What things have to be considered when constructing a rocket? Which would fly the highest: an Estes rocket or a compressed air rocket? Why?

3. What is apogee?

4. Why should you wear goggles for this lab?
5. How was the Estes rocket ignited versus the air compressed?
6. What are the four forces of flight and their definitions?

Procedure

Our procedure has been adapted from Science Toy Maker; see the full version with pictures: <https://sciencetoymaker.org/air-rockets/make-air-rockets/>

1. Decide how many fins, what type of fin, and fin placement.
2. Draw one fin type on the template worksheet.
3. Cut out fins and tape fins to the rocket.
4. Close the top of the rocket by pushing down one side of the tube 1.5 cm from the top. Push the opposite side down the same amount, so they are both horizontal.
5. Repeat with two new peaks for a total of four pieces of tape.
6. Push down one the two remaining sides, and then the final side. When finished, you should have a flat top to your rocket.
7. Slide the rocket completely down the vertical pipe. When everyone is clear and when your instructor gives the signal, launch by stomping on the middle of the soda bottle.
8. Use a stopwatch to time and record the length of time it is in the air.
9. Test your rocket three times, then work with your group to decide on a variable to change that will make your rocket stay in the air longer.
10. Test your rocket an additional three times after making the change.

Independent variable: the variable that is changed. _____

Dependent variable: the variable being measured. _____

Hypothesis: I think the rocket with _____ will go (higher or lower)

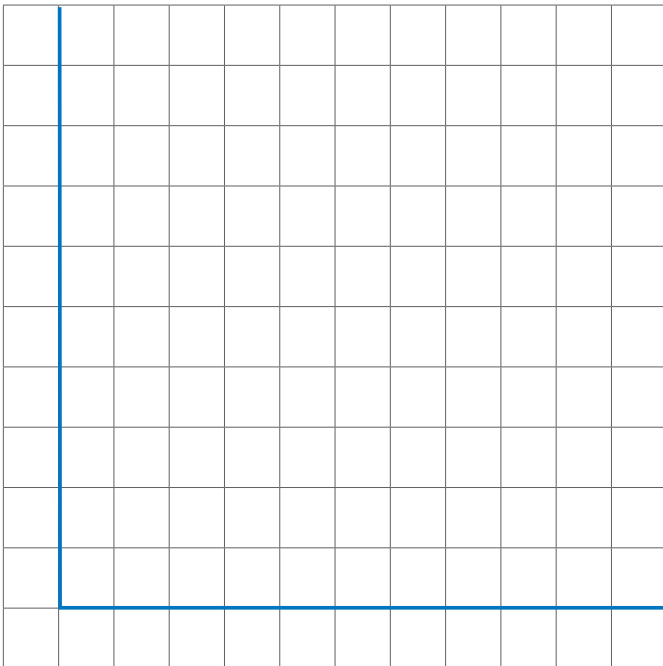
because _____

Data

Number of trials can be for group or individual.

Sample Data Table Trial	Number of fins	Height in meters
1.		
2.		
3.		

Graph



Present your conclusion to your peers. Was your hypothesis supported? What did your data say? If you could do this experiment again, how would you change it?

Questions

1. What variables worked best for changing the amount of time the rocket flew?
2. What goes on the x-axis and y-axis?
3. What could you do that would make your rocket better?
4. How do the four forces of flight affect your rocket?
5. What provides the thrust for this rocket?