

Name _____

Due Date _____

Chapter 5 Project

Water Bottle Rockets

◆ Introduction

Imagine what would happen if you and a friend were standing on roller skates and you gave your friend a forward push. What would happen to you? Would you stand still or would you travel backward? The backward motion that you would experience can be explained by Newton's third law of motion, which describes an equal and opposite reaction to every action.

In this project, you will use Newton's third law of motion to power a vehicle. Your goal is to construct a water bottle rocket that will stay in the air the longest. At the close of this project your group will:

- ❖ demonstrate your rocket
- ❖ explain how the different forces act upon it (diagram is to be included)
- ❖ explain its features

◆ Project Rules

- ✓ Your group must build your rocket from an empty water bottle.
- ✓ Your group may add any parts you feel will make your rocket stay in the air longer: nosecone, fins, etc.
- ✓ All parts must be built from scratch. No ready-made parts.
- ✓ Your rocket will be launched by your teacher. No exceptions.
- ✓ Your rocket will use 40 psi of air pressure and may only be filled with water.
- ✓ All rockets will be launched straight up.
- ✓ No balloons filled with gases that are lighter than air (like helium) are allowed.
- ✓ For the class presentation, **your group must have diagrams of your rocket that illustrate the forces that act upon it.** You should also be able to explain how the different forces act upon rocket and explain any modifications that you made to improve its performance.

◆ Suggested Materials

- ✓ Here are some ideas for materials to build your rocket: plastic parts cut from other water bottles, cardboard, tag board, straws, fishing line, paper towel rolls.

◆ Project Hints

- ✓ Be creative! Think of ways to counteract the negative forces you are trying to combat.
- ✓ What are some ways, besides having your rocket go higher, that you could make it stay in the air longer? Can you think of ways to slow its descent?

◆ Project Steps

1. Sketch possible ideas
2. Gather materials
3. Construct rocket
4. Test rocket
5. Complete improvements and retest
6. Complete class presentation

◆ Scoring

In evaluating how well you complete the project, your teacher will judge your work in three categories.

	90-100	80-89	70-79	60-69
Vehicle Building	Students follow all Project Rules, and work shows evidence of having thoroughly tested and modified the rocket.	Students follow most of the Project Rules, and work shows evidence of having adequately tested and modified the rocket.	Students follow some of the Project Rules, and work shows evidence of having tested or modified the rocket.	Students did not follow many of the Project Rules, and work shows little evidence of having tested or modified the rocket.
Project Presentation	Presentation is thorough and well organized. Students communicate all appropriate features of the rocket.	Presentation is adequate. Students communicate most of the appropriate features of the rocket.	Presentation is appropriate but is hard to follow. Students communicate some of the features of the rocket.	Presentation is inappropriate and hard to follow. Students communicate a few features of the rocket.
Group Participation	Students take a lead in group discussions and work together fully to complete the project and actively participate in the presentation.	Students participate in all aspects of group discussion and work together to complete the project and participate in the presentation.	Students participate in some aspects of group discussion and somewhat work together to complete the project and the presentation.	Students minimally participate in group discussions and struggle to work together to complete the project and the presentation.