

LAB

The Effects of Air Resistance

Background

If you dropped a bowling ball and a feather from the same height on the Moon, they would both hit the surface at the same time. The objects are attracted to the Moon with the same force, but there is no atmosphere and no air resistance. But on Earth, a bowling ball and a feather will not hit the ground at the same time. Even though all objects on Earth are attracted with the same force, air resistance affects the feather more than it affects the bowling ball.

Question

How does air resistance affect the acceleration of falling objects?

Materials

paper (4 sheets of equal size)
scissors
meterstick
stopwatch
masking tape

Objectives

- **Measure** the effect of air resistance on sheets of paper with different shapes.
- **Design** a shape that maximizes air resistance. Use a piece of paper to create your design.

Safety Precautions

Procedure

1. Read the procedure and safety information, and complete the lab form.
2. Copy the data table, or create it on a computer.
3. Measure a height of 2.5 m on the wall, and mark the height with a piece of masking tape.
4. Have one group member drop the flat sheet of paper from the 2.5-m mark. Use the stopwatch to time how long it takes for the paper to reach the ground. Record the time in your data table.
5. Crumple a sheet of paper into a loose ball, and repeat step 4.
6. Crumple a sheet of paper into a tight ball, and repeat step 4.
7. Shape a piece of paper so that it will fall slowly. You may cut, tear, or fold your paper into any design that you choose. Repeat step 4.

Data and Observations

Table 1

Effects of Air Resistance	
Paper type	Time
Flat paper	
Loosely crumpled paper	
Tightly crumpled paper	
Your paper design	

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(continued)

Conclude and Apply

1. **Compare** the falling times of the different sheets of paper.

2. **Explain** why the different-shaped papers fell at different accelerations.

3. **Explain** how your design caused the force of air resistance on the paper to be greater or smaller than the air resistance on the other paper shapes.

Communicate Your Data

Compare your paper design with the designs created by your classmates. As a class, compile a list of characteristics that increase air resistance.