

*University of Maryland*

*Department of Physics Education and Outreach*

Physics at Home Activities

## **Introduction to Aerodynamics Activity #1: Gravity!**

**Learning Objective:** The following fun activity is the first in a series of three lessons: the law of Gravity, Bernoulli's Principle, and the Coanda Effect. The trio is designed to introduce upper elementary school students to physics concepts related to aerodynamics.

### **Activity #1: Law of Gravity**

#### **1. Collect the following materials:**

- a. 1 Shoe
- b. 1 Piece of computer paper (tightly crumpled)
- c. 1 Chair

#### **2. Instructions:**

- a. Set your chair in a location where the floor in front is clear.
- b. Carefully stand up on the seat of your chair (make sure you have a spotter).
- c. Ask a friend or family member to place the shoe in one hand and the crumpled paper in your other hand.

**Let's  
predict!**

#### **d. Which item will hit the floor first? Why?**

**NOW...** Drop the shoe and computer paper from shoulder height at the same exact time!



**VS.**



### 3. What happened?

#### Did the shoe or the crumpled paper hit the ground first?

After dropping both items, we learn that, even though they have different masses, the two objects hit the ground at the same time! Was your prediction(s) correct? We now know that an object's mass does not affect the rate at which it falls. The rate is constant! We refer to this constant as **gravity**! It is important to note that you are observing gravity at ground level on the surface of the Earth, where gravity is constant!

#### More about Gravity!

Gravity affects everything that has mass. It is an attractive force, which we humans do not actively feel, but it keeps our feet on the ground! As we now know gravity is a constant, but it is important to know the more massive an object (the heavier), the stronger the gravitation pull. Thinking back to our experiment, we can confirm that even though the gravitational pull on the shoe was stronger than that on the paper, they still fell at that same rate! Here at ground level on Earth, gravity pull objects toward the Earth's core at a rate of **9.8 meters per second per second ( $m/s^2$ )**. In other words, for every second an object is in free fall, it's speed increases by about 9.8 meters per second.

**Extension:** *Try this experiment again, this time use a regular (not crumpled) sheet of paper and a shoe. Is the result the same?*

#### Key Terms:

Aerodynamics- study of how things move through the air.

Mass- the amount of matter an object contains.

Matter- anything that takes up space or has mass or volume. Everything is made of matter!

Gravity- an attracting force that pulls objects together.