

# Terminal Velocity Lab

## Worksheet



Name: \_\_\_\_\_

Date: \_\_\_\_\_

Use this worksheet to predict your terminal velocity in the wind tunnel. During your flight, someone will record your actual terminal velocity. Later, you will compare the two values and see how close your prediction was.

### 1. Derive the equation for your predicted terminal velocity.

Terminal velocity occurs when the flyer is stable, or when there is no acceleration in either direction. In this case, the force of the flyer's weight equals the force of air drag:

$$F_D = F_W$$

The equation for drag force is  $F_D = \frac{1}{2} v^2 \rho C_d A_f$ , and the force of weight is  $F_W = mg$ , where:

$v$  = terminal velocity

$C_d$  = drag coefficient

$\rho$  = air density

$A_f$  = frontal area

$m$  = flyer's mass

$g$  = gravitational acceleration

Substitution yields:

$$\frac{1}{2} v^2 \rho C_d A_f = mg$$

Use this space to solve the above equation in terms of terminal velocity,  $v$ :

1. **Terminal Velocity**

\_\_\_\_\_

2. **Terminal Velocity**

\_\_\_\_\_

3. **Terminal Velocity**

\_\_\_\_\_

4. **Terminal Velocity**

Time (s)	Distance (m)
0	0
1	0.5
2	1.0
3	1.5
4	2.0
5	2.5
6	3.0
7	3.5
8	4.0
9	4.5
10	5.0

\_\_\_\_\_



**1. PURPOSE AND SCOPE OF THE EXPERIMENT**

**2. THEORY**

**3. APPARATUS AND MATERIALS**

1. A set of metal spheres of different diameters and masses.

**4. PROCEDURE**

1. Measure the diameter and mass of each sphere.

2. Drop the spheres from a fixed height.

**5. DATA COLLECTION AND ANALYSIS**