

## Physics LAB: Acceleration due to Gravity

**Purpose:** To determine the acceleration of objects in free fall and whether objects fall at the same rate.

**Materials:** gravity video          stopwatch          calculator

### **Procedure:**

1. You will be shown a video in which 7 different objects are dropped from a height of 12 m, in the Picard Auditorium. You will time each object as it falls and record the time in the Table below.
2. Once you have the time for each object you will square that value and report your average time squared.

### **Table:**

<b>Trial</b>	<b>Object</b>	<b>Mass of Object (g)</b>	<b>Distance (m)</b>	<b>Time (s<sup>2</sup>)</b>	<b>Time (s<sup>2</sup>)</b>	<b>Ave. Time (s<sup>2</sup>)</b>
1	Steel Ball	55	12			
2	Brass Ball	72	12			
3	Steel Cylinder	270	12			
4	Steel Disc	92	12			
5	Ping Pong Ball	7	12			
6	Styrofoam Ball	25	12			
7	Softball	175	12			

3. Finally calculate the acceleration due to gravity using the formula below:

Rank the objects from the one that took the least amount of time to the greatest. After that is complete, calculate the acceleration of each object using the equation:

$$a = \frac{2d}{t^2}$$

	<b>Object</b>	<b>Time (s<sup>2</sup>)</b>	<b>Accel. m/s<sup>2</sup></b>
1			
2			
3			
4			
5			
6			
7			

**Questions:** Answer in the space provided using full sentences.

1. What is the accepted value for the acceleration due to gravity (**g**) ?
2. What do the results of this experiment tell you about how the mass of the object affects the object's acceleration?
3. What do the results of this experiment tell you about how the size of the object affects the object's acceleration?
4. How does air resistance affect the results of this experiment?
5. What is terminal velocity?
6. Which of the above objects has the highest terminal velocity? Why?
7. Which of the above objects has the lowest terminal velocity? Why?
8. What two forces must be equal when an object reaches its terminal velocity?