LAB 8: TERMINAL VELOCITY

QUESTION

What is the terminal velocity of a weighted balloon?

SAFETY

Keep balloons and pennies out of the reach of young children; they pose a choking hazard.

MATERIALS

Balloon, tape, 4 pennies, ruler, stopwatch

PROCEDURE

In this lab, you will be using what you know about distance versus time graphs to analyze a graph that you have not seen before. You will drop a light object and measure the time that it takes to hit the ground. The distance versus time graph will be more complex than those that you have done so far.

1. Blow up a large balloon to full capacity. Holding the balloon with the knot on top, tape four pennies evenly along the bottom so that when dropped, the balloon will fall straight down.

Data Chart

Distance	Time 1	Time 2	Time 3	Average Time	Average Speed	Final Speed
50 cm						
75 cm						
100 cm						
125 cm						
150 cm						
175 cm						
200 cm						

2. Put temporary marks or tape on a wall at distances of 50, 75, 100, 125, 150, 175, and 200 cm.
3. Have a partner help you drop the balloon and time how long it takes to hit the ground.
4. Record your data in a chart similar to the one above.
5. Create a line graph with average time on the horizontal axis and final speed on the vertical axis.

Post-Lab Questions
1. From your graph, determine when there was a change in the balloon's motion (for example, from constant speed to acceleration).
2. Describe the shape of your graph before and after the change and explain what the shape means about the balloon's motion.
3. Choose a segment after the change in the balloon's motion and calculate the speed.
4. If you had not blown up the balloon all the way, would it have taken more time or less time to reach that velocity?

Discussion
When an object falls from a large distance, it reaches a point where air resistance prevents it from traveling any faster. This speed is its *terminal velocity*. The terminal velocity of a skydiver is approximately 120 mi./hr. (53 m/s). An object that is less dense than a skydiver can have a much slower terminal velocity. An object that is more streamlined could have a higher terminal velocity. Once the object reaches its terminal velocity, it cruises at that velocity for the rest of its fall.

Recall that a distance versus time graph for an accelerating object curves upward, and for an object traveling at constant speed, the graph produces a straight, diagonal line.