

Look Out Below

Overview: If you jump out of an airplane, how fast would you fall? What's the greatest speed you would reach? Let's practice figuring it out without jumping out of a plane.

This experiment will help you get the concept of velocity by allowing you to measure the rate of fall of several objects.

What to Learn: In this experiment, learn how an object's motion can be described by recording the change in its position over time. Changes in velocity can be changes in speed, direction, or both.

Materials

- stop watch
- feathers (or small pieces of paper, a plastic bag – anything light and fluffy)
- tape measure

Lab Time

1. Get five or so different light and fluffy objects. Feathers of different size, small strips of paper, parts of a plastic bag, cotton balls, whatever is handy.
2. Make a prediction by writing down the objects you chose in order of how fast you think they will fall.
3. Drop the different items and time them from the moment you let go to the moment they hit the ground. Be sure to drop each item from about the same height. The higher the better. Just be sure not to fall off anything! We don't want to measure your velocity!!
4. Drop individual items two or three times to get an average time.
5. Now compare the items. Which one fell the least amount of time (dropped the fastest)? Which one fell the most amount of time (dropped the slowest)? Record your results. By the way, did you find anything that dropped slower than a feather? I have seen very few things that take longer to fall straight down than a feather.

Look Out Below Data Table

Trial Number	Object	Time (seconds)

Reading

Speed tells us how fast an object is traveling, but velocity adds another variable. Velocity is the speed of an object AND the direction in which it's moving. For constant velocity, both the speed of an object and its direction must be constant. Acceleration occurs when velocity increases and deceleration is a decrease in velocity.

In this experiment, you will see how many of your objects stop accelerating very quickly. In other words, they reach their terminal velocity soon after you let them go and they will fall all the way to the ground at that same constant velocity. This is why a parachute is a skydiver's best friend! A human has a decent amount of air resistance, but he or she can reach a velocity of 120 mph if dropped from a great height. The parachute increases the air resistance so that the terminal velocity of that skydiver is quite a bit safer!

Exercises Answer the questions below:

1. What is velocity?
2. How do acceleration and deceleration relate to velocity?
3. How do we know when an object has reached terminal velocity?

Answers to Exercises: Look Out Below

1. What is velocity? (It's the measure of speed combined with the direction an object is traveling.)
2. How do acceleration and deceleration relate to velocity? (Acceleration is an increase in velocity; deceleration is a decrease in velocity.)
3. How do we know when an object has reached terminal velocity? (This occurs when an object has reached a constant velocity and is no longer accelerating or decelerating.)