

## Flights of Fancy

### What is this about?

In the “Fall Classic” experiment, you learned about gravity and how it effects objects that are falling straight downward. Here you will understand how gravity affects a flying object like a lined shot headed for the Green Monster.



### What do I need?

You will only need two baseballs (actually, any two objects will do; coins, keys,...).

### What will I be doing?

You will hold one ball in each hand. When you are ready, you will toss one horizontally at the same time you drop the other. Then you will see which one hits the ground first.

### What do I think will happen?

Take a minute and write down a description of what you think will happen and why you think it. Will the tossed ball hit the ground first or will the dropped one?

### What really happened?

1. Hold one baseball in each hand in front of you. Practice a few times until you can drop one straight down at the same time you toss the other horizontally to the side. Be very sure that you don't toss the ball upward or downward at all, just to the side.
2. Listen carefully to determine which one hits the ground first.
3. Repeat this several times tossing the ball with different speeds.

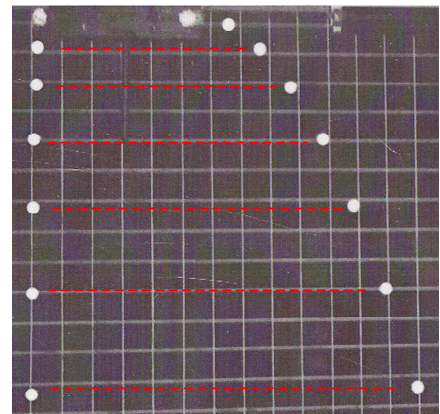
Write a description of your results.

### What did I learn?

This is another amazing feature of gravity, it works the same whether a ball is a line drive to center, a pop-up to the infield, or a long homerun. The liner, the pop-up, and the homer all feel the effect of gravity the same way. The only difference is that each one left the bat with a different speed and a different direction.

### What else should I think about?

At the right is a flash photograph of a ball that is dropped at the same time as a ball that is tossed horizontally. The images are taken in front of a grid every 20<sup>th</sup> of a second. You can see that both balls have fallen the same amount in each image (red dashed lines). The other thing to notice is that the tossed ball that is traveling the same amount horizontally in each picture (almost exactly one grid line).



The idea that a thrown object always moves vertically just like a dropped object and moves horizontally at a constant rate allows scientists to predict the motion of projectiles that feel little air drag. Sadly, for a well-hit baseball air drag and other forces complicate the motion.



### Catch it in the Web!



Animation of the flight of a baseball by Harold T. Stokes

([http://stokes.byu.edu/teaching\\_resources/baseball\\_flash.html](http://stokes.byu.edu/teaching_resources/baseball_flash.html))

This Flash animation shows the path of a baseball in two-dimensional projectile motion.

The components of the velocity vectors can be shown.