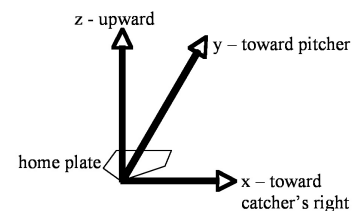


On September 14, 2008 a very unusual Major League Baseball game was played between the Chicago Cubs and the Houston Astros. Due to Hurricane Ike moving through Houston the game was played in neither teams home stadium. It was at a neutral site, Miller Park in Milwaukee. The uniqueness of the game expanded in the ninth inning when Carlos Zambrano struck out Darin Erstad to complete a no-hitter, the first no-no at a neutral site in major league history. Below is a table containing the PitchFX kinematic data in three dimensions for the final pitch of the game and a graphic illustrating the coordinate system.



	x-direction	y-direction	z-direction
initial position (ft)	-2.434	50.0	5.428
initial velocity (ft/s)	3.344	-125.384	-4.389
acceleration (ft/s ²)	-13.031	25.891	-29.975



1. Find the initial speed of the pitch in mph.
2. Use the data from the y-direction to find the time for the pitch to get from the pitcher to the back of home plate. You will have to solve a quadratic equation. One answer will be reasonable and the other is not.
3. Use the time of flight to find the (a)x-component of the velocity, (b)y-component of the velocity, (c)z-component of the velocity, and (d)speed (in mph) of the pitch when it gets to the back of home plate.
4. Find the (a)x-position, (b)y-position, and (c)z-position of the ball at the back of home plate. Your right! The answer to part b is zero. If you can find a video of this pitch on-line you can check your answer.