

# The Movement of a Pitched Baseball

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Recently, I was asked why pitchers throw off of a mound. Aside from the obvious reason of providing a pitcher with additional downward velocity, it peaked my interest to learn a little more. In my research I found that up until 1968, baseball rules allowed up to a 15 inch mound. Well, as the game evolved and players got bigger and stronger, pitchers began getting more powerful and that led to a decline in batting statistics. Knowing that highlight moments of home runs and higher scoring games sells tickets, major league baseball decided to lower the mound to the now standard 10 inches in 1969. It is documented that batting averages as a whole increased by 15 points, thus leading to a more offensively involved sport for spectators. Aside from the history of the pitcher's mound, there is a scientific means for calculating the vertical movement of a pitch. To explain how a baseball travels after it is thrown, we will use the following equation: vertical distance =  $1/2 gt^2$  so we know that if we plug in the distance of the mound (9.8m) then we can come to the equation  $1/2(9.8m/s/s)(v)^2 = d$ . For the equation "t" represents time, "v" stands for velocity, which is determined by the amount of time it takes from a pitcher's release point to the time the ball hits the glove, and "s" stands for seconds. The result is "d", which stands for the amount of movement the baseball has. Contrary to the appearance of the ball travelling in a uniform linear direction from pitcher release to the catcher's glove, there is gravitational pull that must be accounted for. That is one of the benefits of pitching off of a mound, it increases the velocity a pitcher can generate and reduces the 'rainbow effect' of a thrown ball. In addition to the discussed equation, it is important to note that there are many other factors that can be accounted for to get a more accurate reading. This includes ball rotation and air and/or wind resistance, both of which constantly change depending on the weather and venue of the baseball field.

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