How To Compute The Odds of Powerball

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Powerball odds and probabilities for the Powerball Jackpot – and how to calculate these Powerball odds. Additional calculations show tie probabilities and expected return on your “investment”.

Updated for the 69/26 Game

Concise Table of Powerball Odds (Mathematical derivation below)

Ticket Matches	Payout	Odds	Probability
5 White + PB	Jackpot	1 in 292,201,338.00	0.000000003422
5 White No PB	1,000,000	1 in 11,688,053.52	0.00000008556
4 White + PB	50,000	1 in 913,129.18	0.000001095
4 White No PB	100	1 in 36,525.17	0.00002738
3 White + PB	100	1 in 14,494.11	0.00006899
3 White No PB	7	1 in 579.76	0.001725
2 White + PB	7	1 in 701.33	0.001426
1 White + PB	4	1 in 91.98	0.01087
0 White + PB	4	1 in 38.32	0.02609
Win something	Variable	1 in 24.87	0.0402

Game Rules

The numbers picked for the prizes consist of 5 white balls picked at random from a drum that holds 69 balls numbered from 1 to 69. The Powerball number is a single ball that is picked from a second drum that has 26 numbers ranging from 1 to 26. If the results of these random number selections match one of the winning combinations on your lottery ticket, then you win something.

You can also buy a “Power Play” option. The multipliers in the 69/26 Power Play game increase the payout amounts for the non-jackpot prizes as shown in the “Power Play Option” section. (Scroll down the page.)

In the game version that began as of Jan. 15, 2016, it costs $2 to buy a ticket instead of the previous $1. The Power Play option costs another $1; and as noted above, the payout amounts have been changed.

Before we start computing the odds and probability, you need to know some basics of combination in pick n balls from m balls. That is, you should know how to compute how many ways to choose n(n<=m) balls form a pool of m balls. Imagine we pick one ball at a time, we have m ways to choose the first ball, then m-1 ways to choose the second, m-2 ways for the third … so we end up with m*(m-1)*(m-2)*(m-3)..(m-n) ways. This can be easily expressed in factorial format m!/(m-n)!. But, wait,the order of the five numbers does not matter. For each five-number, there are 5! ways to rearrange the order, so we in fact count the same ticket for n! ways. The botoom of line is, there are in fact m!/((m-n)!*n!). In the case of Powerball, there are total 69!/(64!*5!) ways to choose the 5 white balls and 26!/(25!*1!) ways to choose the power number. And that final number is 292,201,338. Just keep that in mind as we need this number for the computation. Let’s call it T. ##Total how many different ticket we can have This is the same as how many ways we can pick the 5+1 numbers for a ticket.

```
factorial(69)/(factorial(64)*factorial(5))*26
```

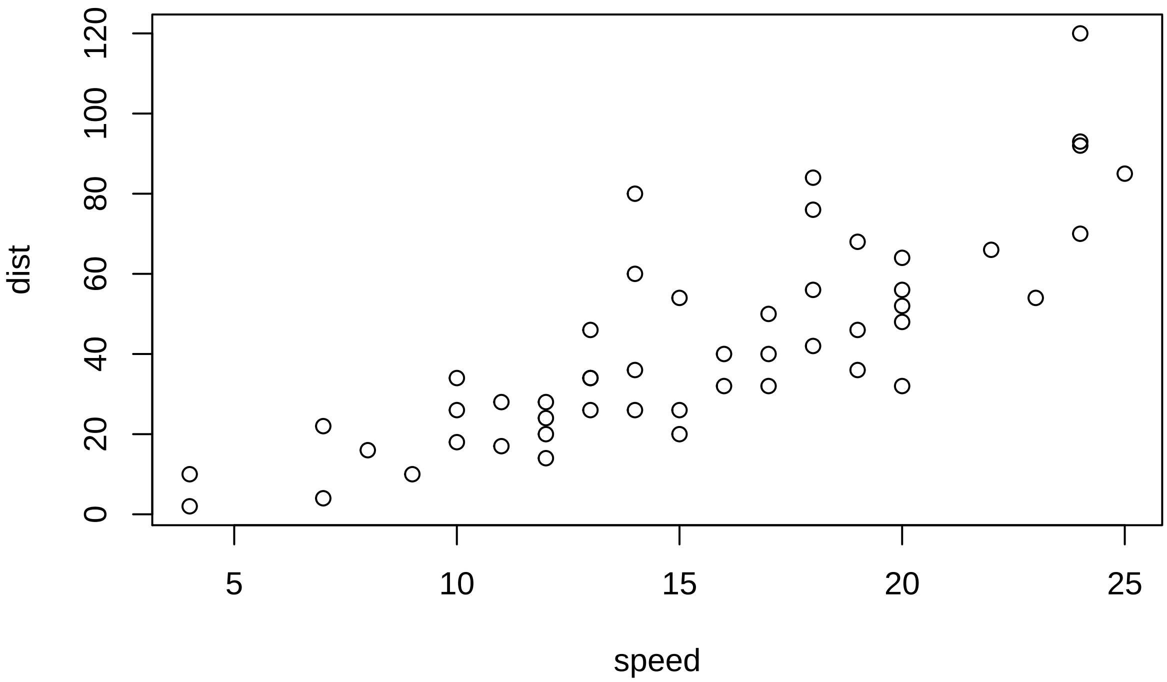
```
## [1] 292201338
```

Alternatively, we can use choose() function from R to compute it.

```
choose(69,5)*choose(26,1)
```

```
## [1] 292201338
```

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.