5-of-5 Fantasy 5 Odds Calculation

According to the rules of probability, the number of combinations of n items taken r at a time are:

$$\frac{n!}{r!\,(n-r)!}$$

where $n! = n * (n-1) * (n-2) * ... * 2 * 1$.

This rule applies to situations where the order of the items chosen is irrelevant, such as the drawing of 5 numbers out of 36 as used in the Fantasy 5 game.

In the Fantasy 5 game, n =36 and r = 5. When the formula above is calculated with these values for n and r, the result is 376,992.

$$\frac{36!}{5! * 31!} =$$

$$\frac{36 * 35 * 34 * 33 * 32 * 31!}{5 * 4 * 3 * 2 * 1 * 31!} =$$

$$\frac{36 * 35 * 34 * 33 * 32}{5 * 4 * 3 * 2} =$$

$$376,992$$

This means that there are 376,992 different ways in which 5 numbers can be chosen from a total of 36 numbers. Therefore, the odds of correctly choosing the winning combination is 1 to 376,992.

5-, 4- & 3-of-5 Fantasy 5 Odds Calculation

The formula to determine the probability of selecting Z correct out of R draws from N numbers is as follows:

$$\frac{\dfrac{R!}{Z!\,(R-Z)!} * \dfrac{(N-R)!}{((N-R)-(R-Z))!\,(R-Z)!}}{\dfrac{N!}{R!\,(N-R)!}}$$

where $R! = R * (R-1) * (R-2) * ... * 2 * 1$.

Using four-out-of-five as an example, the above formula is:

$$\frac{\dfrac{5!}{4! * 1!} * \dfrac{31!}{30! * 1!}}{\dfrac{36!}{5! * 31!}} =$$

$$\frac{\dfrac{5 * 4!}{4! * 1} * \dfrac{31 * 30!}{30! * 1}}{376,992} =$$

$$\frac{5 * 31}{376,992} =$$

$$\frac{155}{376,992} =$$

$$\frac{1}{2,432.21}$$