6-of-6 LOTTO Odds Calculation

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

\[
\binom{n}{r} = \frac{n!}{r! \cdot (n-r)!}
\]

where \(n! = n \cdot (n-1) \cdot (n-2) \cdot \ldots \cdot 2 \cdot 1\).

This rule applies to situations where the order of the items chosen is irrelevant, such as the drawing of 6 numbers out of 53 as used in the LOTTO game.

In the LOTTO game, \(n = 53\) and \(r = 6\). When the formula above is calculated with these values for \(n\) and \(r\), the result is 22,957,480.

\[
\frac{53!}{6! \cdot 47!} = \frac{53 \cdot 52 \cdot 51 \cdot 50 \cdot 49 \cdot 48 \cdot 47!}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 47!} = \frac{53 \cdot 52 \cdot 51 \cdot 50 \cdot 49 \cdot 48}{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2} = 22,957,480
\]

This means that there are 22,957,480 different ways in which 6 numbers can be chosen from a total of 53 numbers. Therefore, the odds of correctly choosing the winning combination is 1 to 22,957,480.