52 = 51 + 1

52 = 2 \cdot 26 = 4 \cdot 13 = 2 \cdot 2 \cdot 13 = 2^2 \cdot 13

Smallest "untouchable number": never the sum of proper divisors of any other number.

52 = 4^2 + 6^2

The fifth Bell number - the number of ways five different objects can be arranged in distinct sets. (Others are 1, 1, 2, 5, 15, 52, 203, 877, 4140, 21147)

decagonal number \( 52 = 5^2 + 3^3 \)

dimension of exceptional Lie algebra.

Smallest number that's the sum of 4 squares 4 ways

\[
\begin{align*}
52 &= 1^2 + 1^2 + 1^2 + 7^2 \\
  &= 1^2 + 1^2 + 5^2 + 5^2 \\
  &= 2^2 + 4^2 + 4^2 + 4^2 \\
  &= 3^2 + 3^2 + 3^2 + 5^2
\end{align*}
\]

Congruent number.
Integers of \( \mathbb{Q}(\sqrt{-52}) \) have class number 2.

52! + 52 + 1 prime. Others known: 4, 6, 10.

Sum of 2 primes in 3 ways: \( 52 = 5 + 47 = 11 + 41 = 19 + 23 \)