Problem of the Week

Problem C

000000 Means the End

The product of the positive integers 1 to 6 is
\[ 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720 \]
and can be written in an abbreviated form as 6!. We say, “6 factorial”. So 6! = 720.

The product of the positive integers from 1 to 12 is
\[ 12 \times 11 \times 10 \times \ldots \times 3 \times 2 \times 1 = 479,001,600 \]
and can be written in an abbreviated form as 12!. We say, “12 factorial”. The \( \cdots \) represents the product of all of the missing integers between 10 and 3.

For a positive integer \( n \), the product of the positive integers from 1 to \( n \) is \( n! \).

Find the smallest possible value of \( n \) such that \( n! \) ends in exactly six zeroes.