Amazing Arithmetic Properties of 12,345,679

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We derive some multiplicative properties of the number 12,345,679. We show that these properties are a special case of the properties of the number $\beta = (b^{b-1} - 1)/(b-1)^2$ written as a number in the base b number system, where $b \geq 3$. We show how to generate the digits of the number $K\beta$, for integers K such that $1 \leq K \leq (b-1)^2$, as a number in the base b number system. The proof of this method involves an interplay between multiplication in the base b number system and generating an arithmetic sequence associated to the digits of K, expressed as a number in the base $b-1$ number system, reduced modulo $b-1$.

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