A numerical semigroup is an additive subsemigroup of \((\mathbb{N}, +)\). If \(n_1, n_2, \ldots, n_k\) are generators for a numerical semigroup \(S\), then a factorization of \(n\) is an expression \(n = a_1n_1 + \cdots + a_kn_k\), in which the natural number \(a_1 + \cdots + a_k\) is the length of the factorization. Much of the literature deals with extremal factorization behavior, such as the maximum and minimum factorization lengths. Quantities of intermediate size, such as the mean, median, and mode factorization lengths are more subtle. We use techniques from analysis and probability to describe the asymptotic behavior of these quantities. Surprisingly, the asymptotic median factorization length is described by a number that is usually irrational.

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