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Exploring the curiously fascinating integer sequence 1, 12, 123, 1234, 12345, 123456, 1234567, 12345678, 123456789, 1234567891, 12345678912, 123456789123,

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Summary: This article considers the integer sequence 1, 12, 123, 1234, 12345, 123456, 1234567, 12345678, 123456789, 1234567891, 12345678912, 123456789123, Our goal is to examine the structure of the sequence by exploring divisibility patterns including securing prime outputs and determining the highest power of two that is a possible factor of any term in the sequence. Using MATHEMATICA[®], I was able to obtain the complete prime factorizations for the initial 108 terms in the sequence. The deployment of modular arithmetic will enable us to secure recurring prime factors from complete groupings such as 123456789, 123456789123456789, 123456789123456789123456789, We conclude by suggesting future directions for companion sequences that serve to furnish additional stimulating research. Such possibilities include extensions, the sequence reversal, and examining the sequence and its reversals in different number bases such as hexadecimal and duodecimal (base twelve).

Classification: F60 I30

Keywords: sequences; factorization; divisibility