

Problem of the Week

Problem D

Grouping Digits

Did you know that the sum of the first n positive integers can be determined using the formula $\frac{n(n+1)}{2}$? That is, $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$. For example, if we wanted the sum of the first 20 positive integers, then we would let $n = 20$ in the formula and the sum is $\frac{20(21)}{2} = 210$. You may prove this at a later point in your mathematics class but this formula may be helping in solving the following problem.

Using only the digits 1, 2, 3, 4, and 5, a sequence is created as follows: one 1, two 2's, three 3's, four 4's, five 5's, six 1's, seven 2's, eight 3's, nine 4's, ten 5's, eleven 1's, twelve 2's, and so on.

The first few terms of the sequence appear as

1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, \dots

Determine the 2017th digit in the sequence.

