



## Problem of the Week

### Problem E

#### Down to One

The *digit sum* of a positive integer is found by summing its digits.

The *digital root* is found by repeatedly calculating the digit sum until a single digit is achieved.

The digit sum of 413 is 8, since  $4 + 1 + 3 = 8$  and 8 is a single-digit number.

Note that the digital root is also 8, and this is calculated in one step.

The digit sum of 642 is  $6 + 4 + 2 = 12$ , which is not a single-digit number. The digit sum of 12 is  $1 + 2 = 3$ , which is a single-digit number. Therefore, the digital root of 642 is 3. This is calculated in two steps.

The digital root of 4 is 4. This is calculated in zero steps.

How many three-digit numbers have a digital root of 5 that is calculated in three or fewer steps?

$$4 + 1 + 3 = 8$$

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