Slumber Theory

Slumber theory is a silly branch of mathematics, which exists only on this page.

Any number can be **sliced** into a sequence of numbers.

**Example:** 365 can be sliced in four different ways: 3 | 6 | 5; 36 | 5; 3 | 65; or 365.

(Note that the slices are indicated by a vertical slash. Note also that in slumber theory, not slicing is considered a form of slicing.)

1. How many ways are there to slice a four-digit number?

A number is **slime** if it can be sliced into a sequence of primes.

**Examples:** 5 is slime, since it is already prime.
   2027 is slime (2 | 02 | 7)
   4,155,243,311 is slime (41 | 5 | 5 | 2 | 43 | 3 | 11)

2. Which one of the following numbers is slime? 12; 345; 6789

3. 2 is the only even prime. Find the first three even slimes.

4. There are no prime squares. Find the first two slime squares.

5. There are no prime cubes. Find the first two slime cubes.

6. 2 and 3 are the only consecutive numbers that are both prime. Find the first three pairs of consecutive numbers that are both slime.

7. There is no triple of consecutive numbers that are all prime. Find the first two triples of consecutive numbers that are all slime.

8. Prove that there are an infinite number of slime numbers.

9. Find the smallest number that is slime in more than one way. (In other words, it can be sliced into two different sequences of primes.)

10. Find the smallest number that is slime in more than two ways.

A number is a **super-slime** if you get a sequence of primes no matter how you slice it.

**Example:** 53 is a super-slime since 53 and 5 | 3 are both sequences of primes.

11. Prove that there are only a finite number of super-slimes.