

Day 5 (July 9, 2012)

What numbers are units in mod 30?

1 is a unit because $1 \cdot 1 = 1$

Is 2 a unit? The multiples of 2 are 2, 4, 6, 8, 10, 12, 14, ..., 30, 2, ... so nothing times 2 will equal 1.

Is 3 a unit? No, because 3 is a factor of 30.

Two numbers are "relatively prime" if they don't share any common factors besides 1. For example, 4 & 7 are relatively prime.

7 and 30 are relatively prime. yay!

7, 14, 21, 28, 5, 12, 19, 26, 3, 10, 17, 24, ①

$7 \cdot 13 = 1 \pmod{30}$ so 7 & 13 are units.

Hypothesis: $7 + 23 = 30 \rightarrow$ so 23 is a unit

Explanation: $-7 = 23 \pmod{30}$

so $-13 = 17 \pmod{30}$

$23 \cdot 17 = (-7) \cdot (-13) = 1 \pmod{30}$