

## Congruence arithmetic.

**Lemma:** If  $x$  and  $y$  are multiples of  $n$ , so is  $x + y$ .

**Proposition:** Given integers  $a, b, c$ , and a natural number  $n$ , if  $a \equiv b \pmod{n}$  then

► If  $c \equiv d \pmod{n}$ , then  $a + c \equiv b + d \pmod{n}$

►  $ac \equiv bc \pmod{n}$

## Congruence arithmetic continued

**Proposition:**

$a^r \equiv b^r \pmod{n}$  for any natural number  $r$ .

## Casting out nines