

Theorem (Fundamental Theorem of Modular Arithmetic)

Let $n \in \mathbb{N}$, and $a, b, c, d \in \mathbb{Z}$. Assume that

$$a \equiv b \pmod{n}, \quad c \equiv d \pmod{n}.$$

Then:

- 1 $(a + c) \equiv (b + d) \pmod{n}$;
- 2 $(a - c) \equiv (b - d) \pmod{n}$;
- 3 $ac \equiv bd \pmod{n}$.

Basically, you can just pay attention to remainders.