BEFORE YOU READ

Expanding the bag

Each number system was built because the one inside it could not solve some equation. Every larger system keeps all the numbers of the smaller one.

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$$

$\mathbb{C}$ **Complex numbers** — `3 + 2i, i`
adds i · solves $x^2 + 1 = 0$

$\mathbb{R}$ **Real numbers** — `√2, π`
adds values like √2

$\mathbb{Q}$ **Rational numbers** — `1/2, -3/4`
adds quotients

$\mathbb{Z}$ **Integers** — `-2, -1, 0`
adds negatives

$\mathbb{N}$ **Natural numbers** — `1, 2, 3, …`
counting

TAKEAWAY

Why the complex numbers exist

The real numbers still could not solve $x^2 + 1 = 0$. Adding i gave the complex numbers, the last link in the chain. The imaginary numbers page follows the problem that forced each step.