
Definition. Two integers are called **coprime** or **relatively prime** if their greatest common divisor is 1.

Theorem. Let $a, b, c \in \mathbb{Z}$ where a and b are relatively prime nonzero integers. If $a \mid c$ and $b \mid c$, then $ab \mid c$.

Corollary. If $p, q \in \mathbb{N}$ distinct primes, then $\sqrt{pq} \notin \mathbb{Q}$.
Proof:

Example. Assume that a and b are coprime. Let $g = \gcd(a+b, a-b)$ and show that $g \mid 2a$ and $g \mid 2b$. Use cases on $\gcd(2, g)$ to prove that $\gcd(a+b, a-b) \leq 2$.