Fundamentals of Arithmetic

Properties of Arithmetic

Commutative Property of Addition

$$a + b = b + a$$

Associative Property of Addition

$$(a + b) + c = a + (b + c)$$

Commutative Property of Multiplication

$$a \cdot b = b \cdot a$$

Associative Property of Multiplication

$$(ab)c = a(bc)$$

Distributive Property

$$a(b + c) = ab + ac$$

Inverse Operations:

Inverse operations are operations that "undo" each other.

Addition ⇔ Subtraction

Multiplication ⇔ Division

Exponents ⇔ Roots

Order of Operations: GEMS

(Simplify within each step from left to right)

G – Grouping Symbols: ( ), [ ], { }, $-$

E – Exponents, Radicals, & Logs: $a^m, \sqrt[n]{a}, \log_b x$

M – Multiplication and Division: $\times,\ \cdot,\ \div,\ /$

S – Subtraction and Addition: $+, -$

Fundamental Theorem of Arithmetic

Every integer greater than 1 is itself prime or is the product of a unique set of prime numbers.

$$\begin{aligned} 72 &= 2 \cdot 36 \\ &= 2 \cdot 2 \cdot 18 \\ &= 2 \cdot 2 \cdot 2 \cdot 9 \\ &= 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \end{aligned}$$