

Properties of Real Numbers

Commutative Properties

Addition: $a + b = b + a$

$$(11 + r) + 8 = (r + 11) + 8$$

Multiplication: $a \cdot b = b \cdot a$

$$3 \cdot 5 = 5 \cdot 3$$

Examples:

Associative Properties

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

$$2 + (x + 5) = (2 + x) + 5$$

Multiplication: $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

$$(4 \cdot y) \cdot 9 = 4 \cdot (y \cdot 9)$$

Distributive Property of Multiplication over Addition

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

$$9(3 + r) = 9 \cdot 3 + 9 \cdot r$$

Identities for Addition and Multiplication

Addition: $a + 0 = a$ & $0 + a = a$

$$0 + 6 = 6$$

Multiplication: $a \cdot 1 = a$ & $1 \cdot a = a$

$$1 \cdot 9 = 9$$

Additive or Multiplicative Inverses

Additive: $a + (-a) = 0$

$$5 + (-5) = 0$$

Multiplicative: $a \cdot \frac{1}{a} = 1$

$$5 \cdot \frac{1}{5} = 1$$